MACHINE and TOOL ENGINEERING

DECEMBER 1942

The TOOL ENGINEER

Official Publication of the American Society of Tool Engineers

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AUGUST 20, 1942

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Under Secretary of War

(from a letter to Pratt & Whitney, July 27, 1942)

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(From an address by Clayton R. Burt, President, Pratt & Whitney, upon receiving the Production Award, August 20, 1942.)

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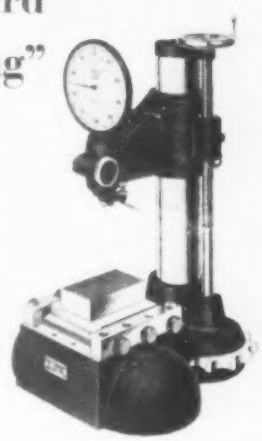

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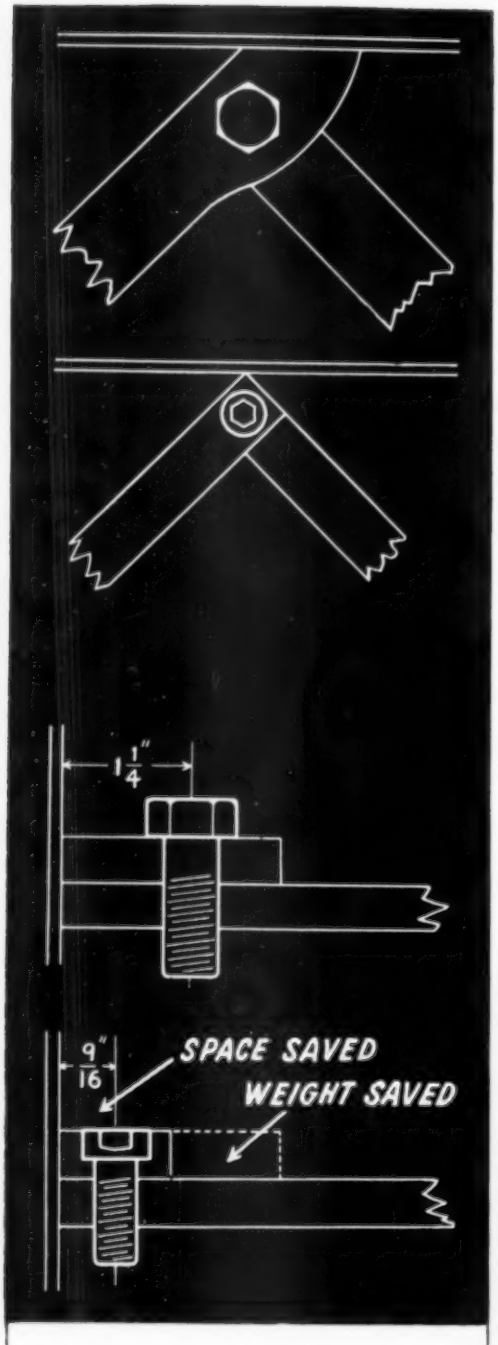

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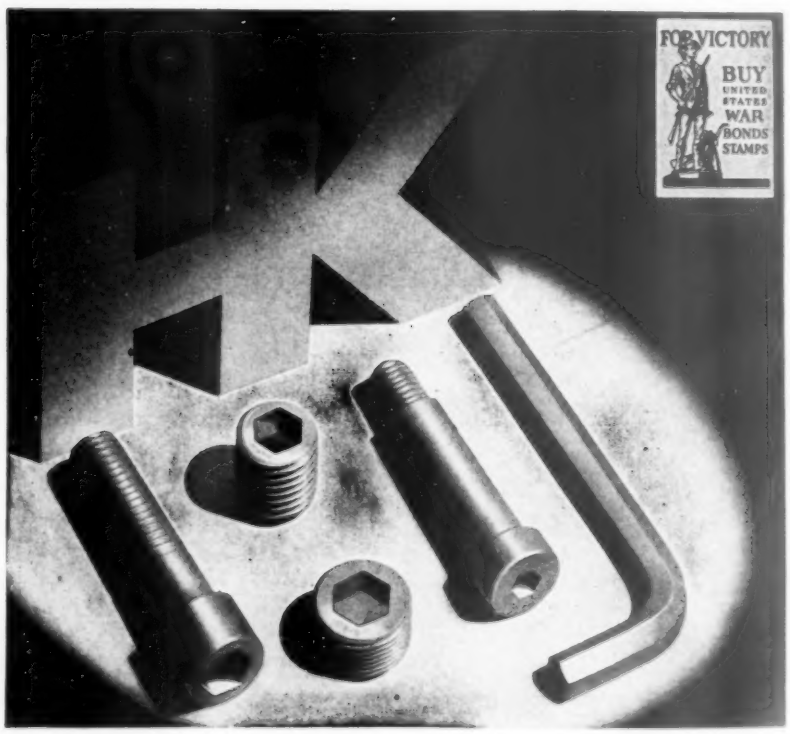

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THE TOOL ENGINEER

Volume XI DECEMBER, 1942 Number 12

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Westinghouse Photo

Sorting scrap is important to salvage. Equally important is product design. These and other phases of materials conservation, including a telegram from Lessing Rosenwald, WPB Conservation Director, are presented in this issue. Turn to page 103.

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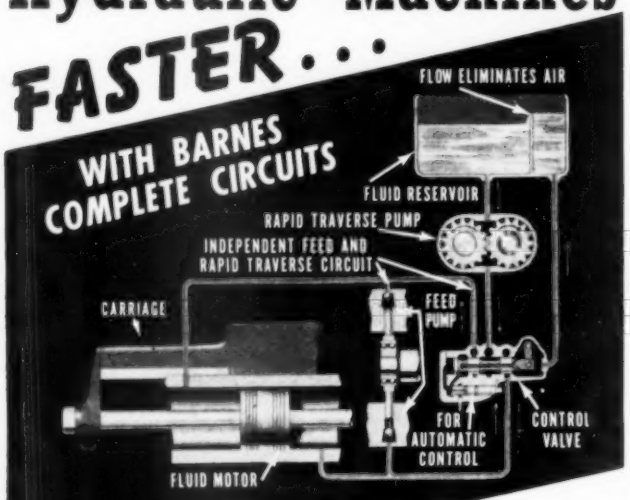

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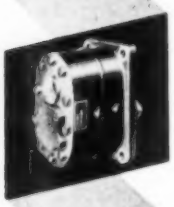

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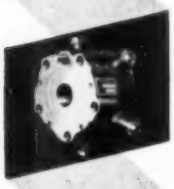

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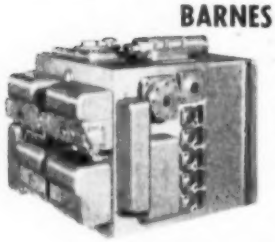

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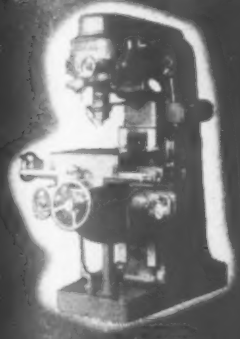
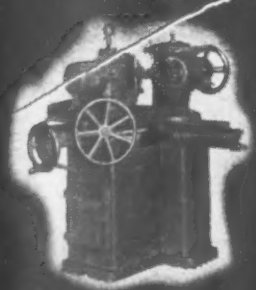


Rotary Head Milling Machine

Autometric Jig Boring Machine

Milwaukee Midgetmill

Milwaukee Speedmill



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Milwaukee, Wisconsin

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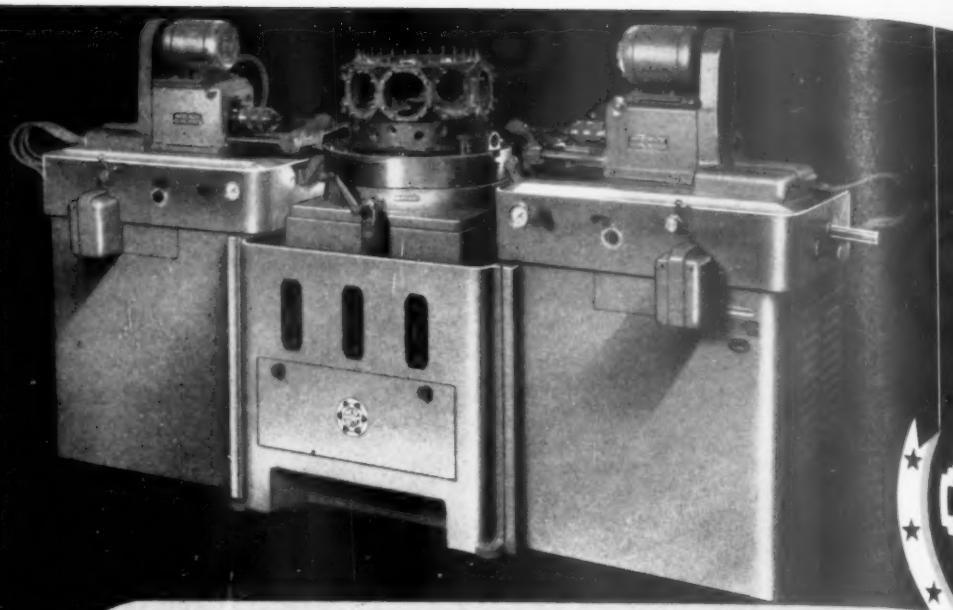

AIRCRAFT···—

Feathering Oil Pump Gear Teeth (Aircraft Engine) external honing.

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SAVE TIME

SAVE METAL

SAVE COST

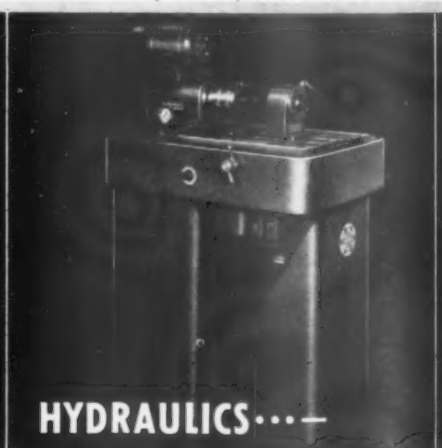
IMPROVE QUALITY

AIRCRAFT···—

Honing Piston Pin Bores (Aircraft Engine).

AIRCRAFT···—

Honing Valve Guides (Aircraft Engine) before assembly.



HYDRAULICS···—

Honing O.D. of pistons for a variable delivery pump.

Honing cast iron valve guides on full automatic Hydrohoner with Micr-O-Size control—Production 250 pieces per hour. Average Stock removed, .0015" to .0025"—Size within .0005" tolerance; accuracy within .0001" to .0002"; surface finish within 3 to 5 microinches, r.m.s.

Honing Piston Pin holes (in Piston) on Double Spindle Hydrohoner with Micr-O-Size control.

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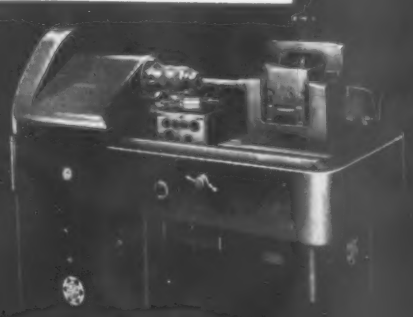
ORDNANCE···—

Double Spindle Hydrohoner with Micr-O-Size control for honing gun charger tube bores.

HYDRAULICS···—

Honing blind end bores in a variable delivery pump body.



HYDRAULICS···—

Honing bores in hydraulic valve body on Micromatic Hydrohoner.

ORDNANCE···—

Honing pinion shaft bores in hardened planetary gear for military vehicle.

70-137

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OFFICE OF THE DISTRICT SUPERVISOR
CENTRAL PROCUREMENT DISTRICT
8505 W. WARREN AVE.
DETROIT, MICH.

July 13, 1942

PRODUCTION SECTION
CENTRAL PROCUREMENT DISTRICT
MANUFACTURERS' LETTER NO. 10
CHICAGO AREA OFFICE

SUBJECT: Cemented Tungsten Carbide for Cutting Tools

1. The following is quoted from memorandum, dated June 19, 1942, from the War Department, Headquarters, Services of Supply, Washington, D.C.:

"In the interest of conservation of critical alloys and of increased production, attention is directed to the following stated advantages of cemented tungsten carbide tools . . .

"a. One pound of tungsten in the form of cemented tungsten carbide for cutting tools will do the work of 70 to 100 pounds of tungsten in high speed tool steel. Furthermore, its use eliminates substantial amounts of chromium and vanadium which are considered necessary components of practically all high speed tool steel.

"b. Cemented tungsten carbide functions satisfactorily on almost all types of lathes and boring machines, particularly those of the sturdier construction. This is said to include all such machine tools manufactured in the last five years.

"c. Cemented tungsten carbide works efficiently on all steels above approximately .30 carbon and is effective up to 500 brinell or more.

"d. Cemented tungsten carbide will give two or three times the production of high speed tool steel in those operations to which its use is adapted and over a given run will require about one-fifth the number of grinds that standard high speed tool steel will require."

2. This information is forwarded by direction, Wright Field letter, EAZ-ar-72-2, (July 3, 1942).

3. Any requests for further information should be directed to the AAF Chicago Area Office, 20 N. Wacker Drive, Chicago, Illinois, Attention: Production Section.

For the District Supervisor:

HARLEY S. JONES
Lt. Colonel, Army Air Forces
Technical Executive

CENTRAL AIR CORPS PROCUREMENT DIST. OFFICIAL WAR DEPT. DETROIT, MICH.

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FIRTHITE T-31*

Hardest, wear-resistant, premium grade for precision boring, etc.

* **TITANIUM** in these FIRTHITE grades makes possible better, faster, cheaper cutting of steel and at the same time permits tool prices comparable with those for high-speed steel. These FIRTHITE grades are made under one or more of the following patents on **TITANIUM** Carbides: 1,925,910; 2,023,413; 2,246,387; 2,265,010; Re. 22,073; Re. 22,074; Re. 22,166; Re. 22,207.

Firth-Sterling

STEEL COMPANY

Offices: McKEESPORT, PA. NEW YORK - HARTFORD - PHILADELPHIA - CLEVELAND - DAYTON - DETROIT - CHICAGO - LOS ANGELES

HOW TO GET THE MOST OUT OF YOUR LATHES

No. 3 in a series of suggestions made by the South Bend Lathe Works in the interest of more efficient war production

Keep Your Lathes Level

The leveling of a lathe can either perpetuate or destroy the best craftsmanship of the machine tool builder. A lathe that is not kept perfectly level cannot turn out the precision work for which it was built.

The lathe bed is comparable to a toolmaker's surface plate. Upon it rest the headstock, carriage and tailstock. Therefore, any twisting of the lathe bed will throw the headstock, tailstock and carriage out of alignment. This will cause the lathe to turn or bore a taper instead of taking a straight cut. It will also cause the alignment of the tailstock center point to shift as the tailstock is moved along the lathe bed, necessitating constant readjustment of the tailstock top set-over.

Every lathe should be checked periodically to see that it is level

Check Leveling Frequently

The major cause of distortion in lathe beds is the settling of the floor supporting the lathe. This is most commonly encountered in buildings that do not have solid foundations or that have wooden floors or columns. There are numerous other conditions which can cause this, such as the shifting of loads on the floor, swelling of wood flooring, deterioration of wooden shims, and atmospheric changes. For these reasons, every lathe should be checked periodically to see that it is level.

How to Level a Lathe

The first requisite for accurate leveling is a precision level at least 12″ long. One that is sufficiently sensitive to show a distinct movement of the bubble when a .003″ shim is placed under one end of it. A carpenter's level, a combination square level, or an ordinary machinist's level cannot be used because they are not sufficiently sensitive.

The leveling of the lathe is tested by placing the level squarely across the lathe bed, immediately in front of the headstock, and also at the extreme right end of the bed. On lathes having long beds, tests should also be made at one or more intermediate positions. Be sure that the ways are wiped perfectly clean of all chips or dirt before using the level.

Metal shims should be used under the lathe at the points indicated by the level as being low. Some lathes are equipped with leveling screws making it unnecessary to use shims.

After all adjustments have been made, bolt the lathe securely to the floor and repeat the tests to make sure that tightening the leg bolts has not affected the leveling of the lathe.

Alignment Test

A simple alignment test can be used to check the leveling of a lathe. Place a bar of steel, one inch or larger in diameter, in the chuck and machine two collars of equal diameter three or four inches apart. Then, take a very light finishing cut across both collars without changing the setting of the cutter bit. Measure both collars with a micrometer. If the collars are not the same diameter, it is an indication that the lathe is not level. Adjust the leveling until, when a cut is taken, both collars are turned the same diameter.

Write for Bulletin H3

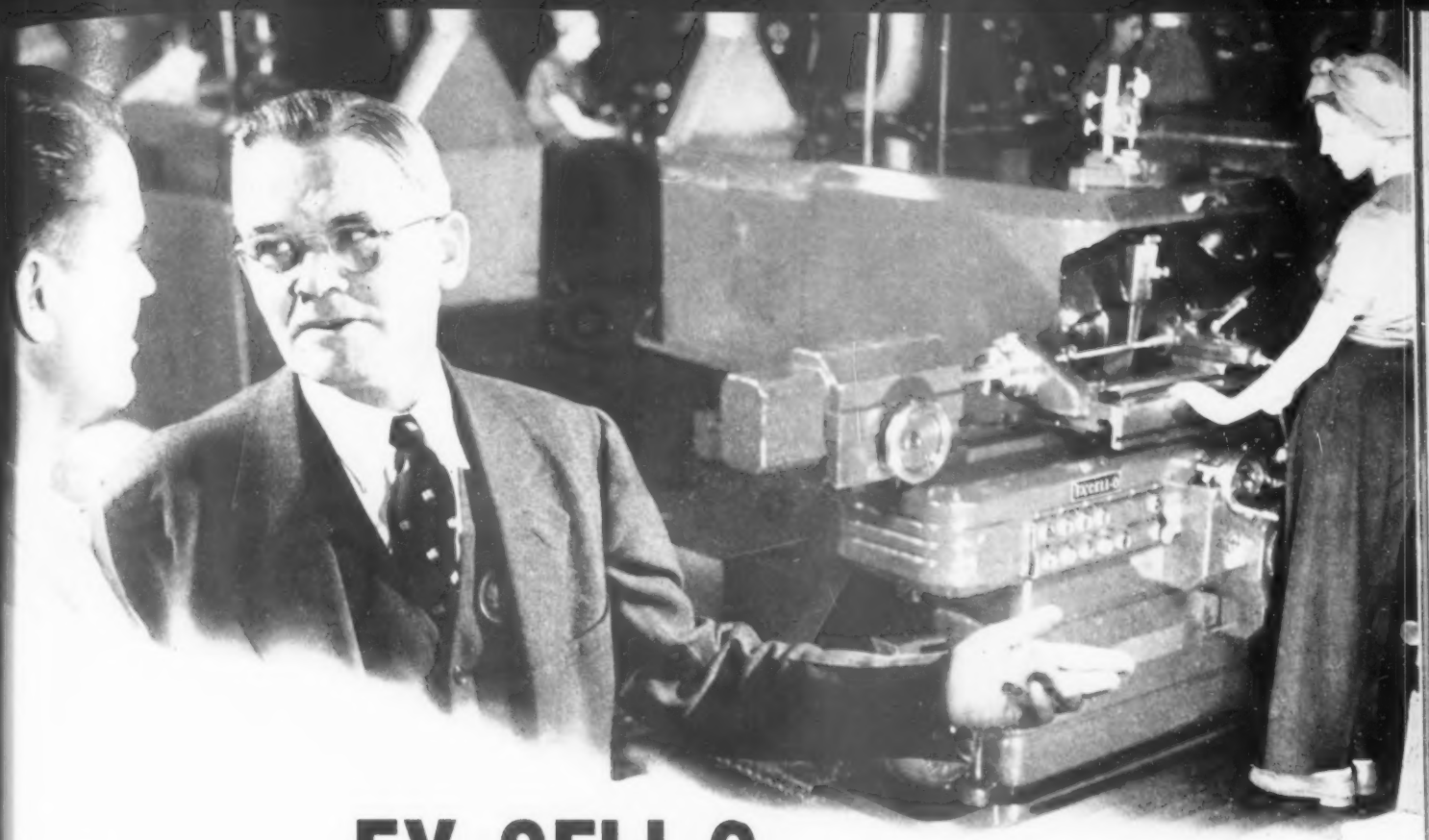
Bulletin H3 giving more detailed information on the installation and leveling of lathes will be supplied on request. Also reprints of this and other* advertisements and bulletins in this series. State quantity.

*Ad. No. 1, "Keep Your Lathe Clean"
Bulletin H1, "Keep Your Lathe Clean"

Ad. No. 2, "Oiling the Lathe"
Bulletin H2, "Oiling the Lathe"

SOUTH BEND LATHE WORKS

South Bend, Ind., U. S. A. • **Lathe Builders for 36 Years**



They're EX-CELL-O *Machines*

. . . KEEP THEM GOING ALL THREE SHIFTS

UNINTERRUPTED production is industry's most urgent job today—'round all the hours on the clock every machine that can "take it" must be kept going if the vast volume of work that war demands is to be produced without delay. . . . Wherever Ex-Cell-O precision machine tools are in use, there's no problem as to continuous service. They're designed and built to "take it", *every* hour of the day, *every* day of the week. The Ex-Cell-O name on a machine tool means not only a *precision-built* machine to do *precision* work, but a machine that gives the utmost in efficiency with a minimum in maintenance attention. . . . To get the best use out of any Ex-Cell-O equipment you have in your plant, you should have available the practical information in the Ex-Cell-O Instruction Book applying to the particular Ex-Cell-O machine you have. If you do not have one now, just write to Ex-Cell-O in Detroit, stating the type and the style of the Ex-Cell-O machine tool you're using, and a copy will be mailed immediately . . . without any cost to you, of course.

Over each of the four plants of Ex-Cell-O in Detroit fly three flags . . . the Stars and Stripes, as always, the Army-Navy "E" pennant, and the first U. S. Treasury "Bull's-Eye" War Bond flag.

EX-CELL-O CORPORATION · DETROIT

Precision THREAD GRINDING, BORING AND LAPPING MACHINES • TOOL GRINDERS • HYDRAULIC POWER UNITS • GRINDING SPINDLES • BROACHES • CONTINENTAL CUTTING TOOLS • DRILL JIG BUSHINGS • DIESEL FUEL INJECTION EQUIPMENT • R. R. PINS AND BUSHINGS • PRECISION PARTS

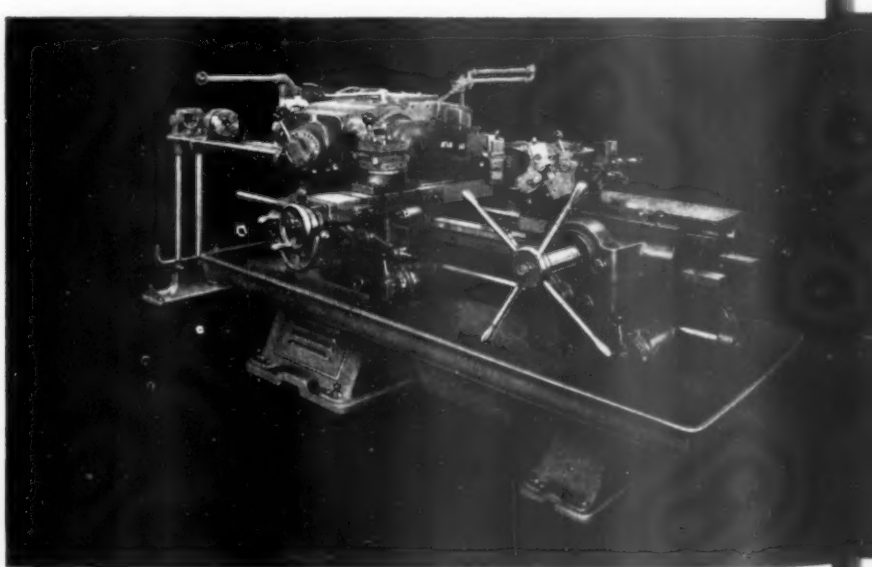
XLO

EX-CELL-O *means* PRECISION

NOT - *How much can be*

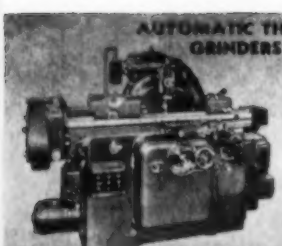
IN 1895, James Hartness, designer of the Jones & Lamson Flat Turret Lathe, told a friend: "Our method of selling was to go into a plant, compute their present costs, and say that we would send a machine, on trial if necessary, and they could send us the savings per month. On this basis we sold many machines, but it soon reached a point where that was not necessary, for people knew what could be accomplished."

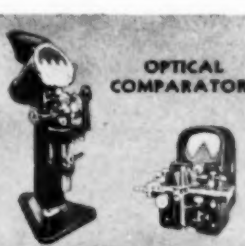
JONES & LAMSON



Manufacturers of Ram & Saddle Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Thread Grinding Machines . . . Comparators . . . Automatic Opening Threading Dies and Chasers

No. 3 Jones & Lamson Ram Type Universal Turret Lathe with standard bar equipment.





saved, but-

HOW MUCH MORE?

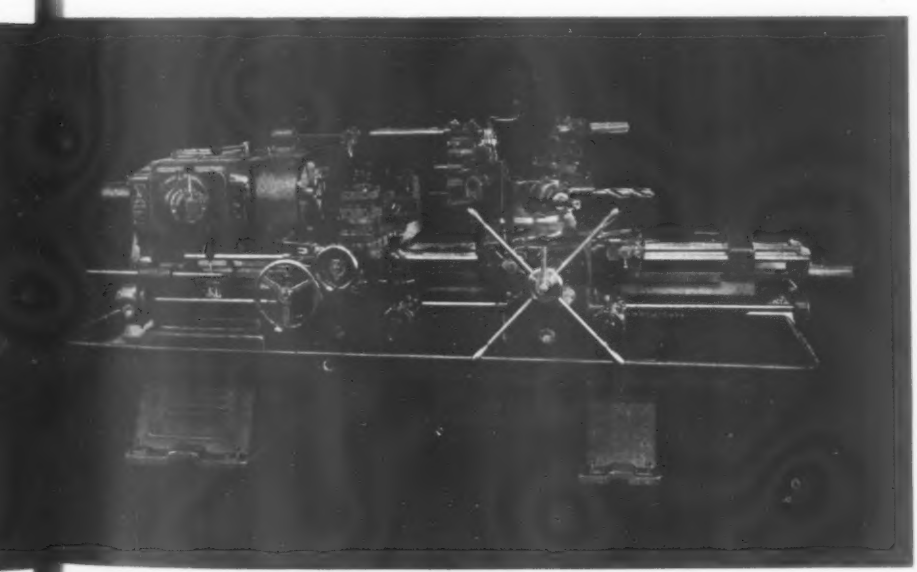
THE flat turret lathes of '95 developed by James Hartness are made no longer, but new Jones & Lamson Turret Lathes — faster, more precise, more rigid and easier to operate than ever — are paying for themselves *over and over* out of savings.

No longer does a skeptical world demand such money-saving equipment from its makers on trial. The big question today is not how much can be saved by Jones & Lamson equipment, *but how much more* when equipment and production plans are co-ordinated by Jones & Lamson methods.

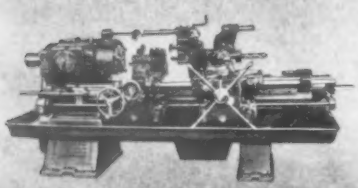
That is why progressive manufacturers habitually put their production problems up to Jones & Lamson engineers. That is why such plants, planned and equipped to meet today's emergency, will be in strategic position to face the harsh competition that is bound to follow this upheaval.

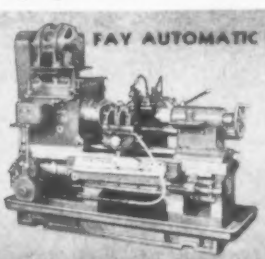
Why not see what Jones & Lamson engineering and Jones & Lamson machines can do to put your plant in such a strategic position? Inquiries from large concerns or small receive thorough, detailed study here, and illustrated catalogs are available.

MACHINE COMPANY - *Springfield, Vermont, U. S. A.*



7A Jones & Lamson Saddle Type Universal Turret Lathe with standard chucking equipment.





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PROFIT PRODUCING
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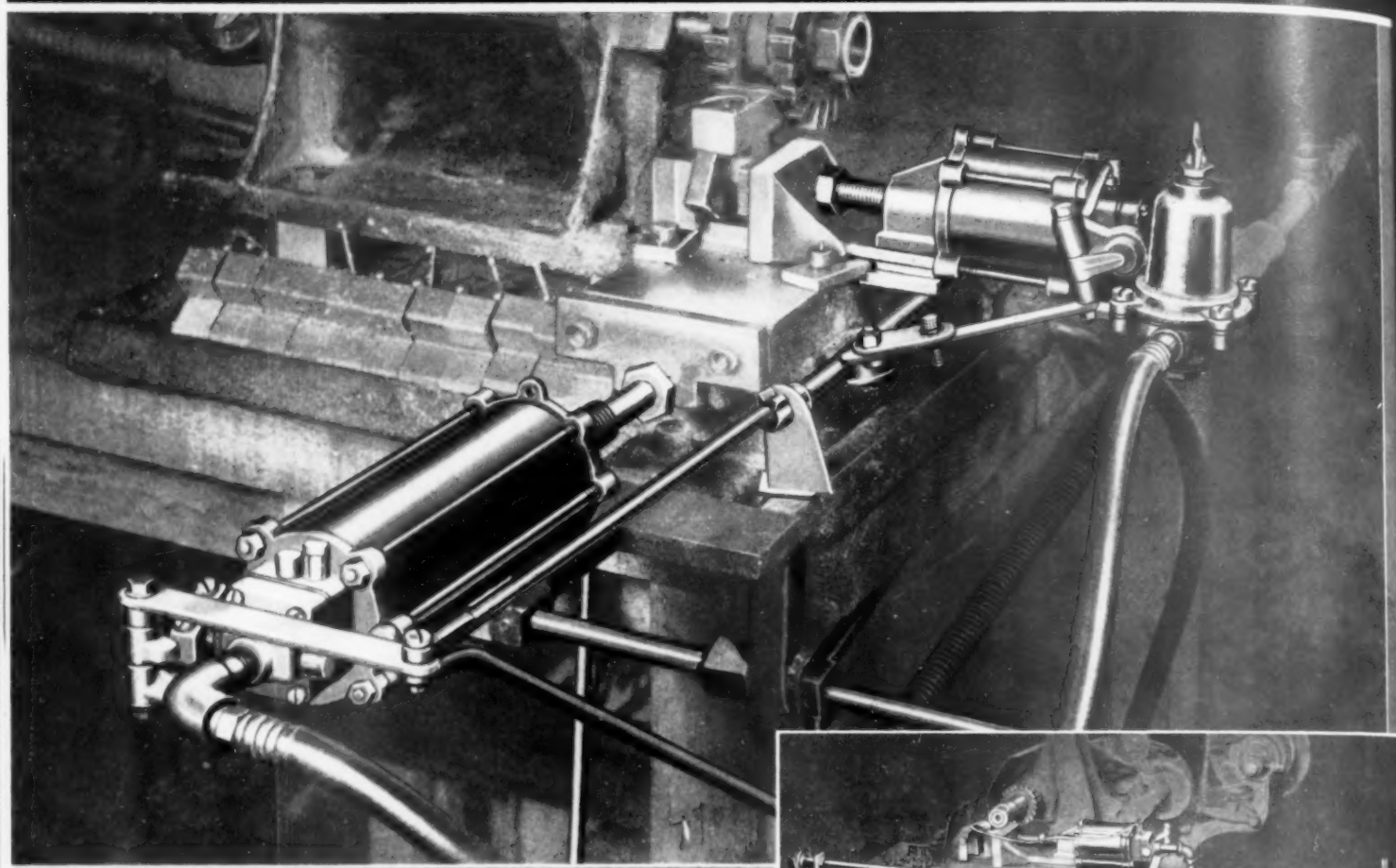
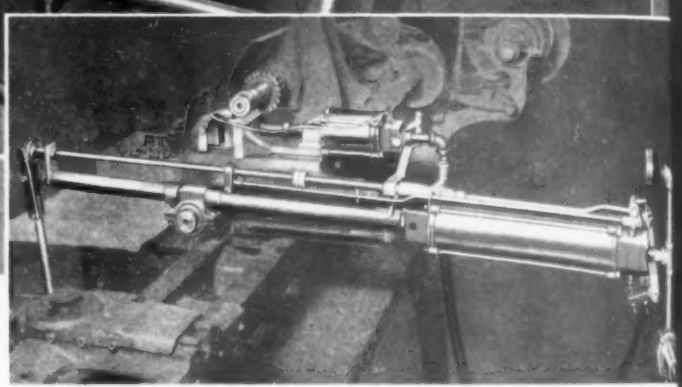
CONVERT IDLE EQUIPMENT for immediate production . . .



330 DURAL KEY SECTIONS PER HOUR. Two Senacon Air Motors and a few salvaged parts produced a highly efficient straddle milling unit for a special aircraft job.



130 AIRCRAFT BOLTS PER HOUR. Two Senacon Air Motors converted an idle engine lathe into a special machine for straddle milling cold rolled square bolt heads.

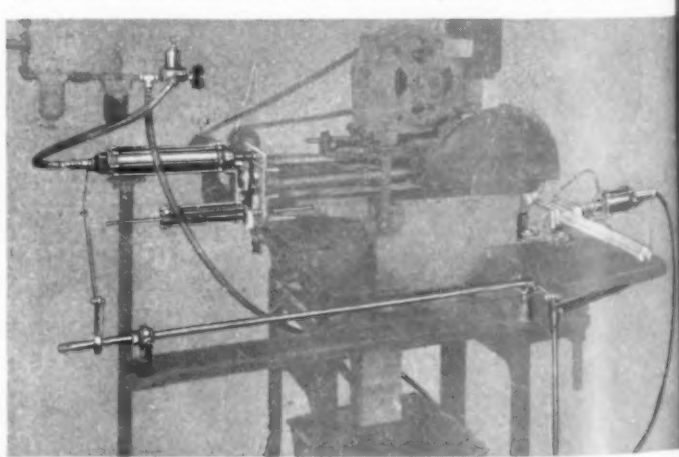
Senacon AIR MOTORS

with Integral Valves provide auxiliary power for converting idle equipment into efficient units that

1. **Give immediate additional production.**
2. **Release large, expensive tools for other uses**
3. **Provide high capacity units for special operations.**

Old machines converted and revived by Senacon Air Motors give greater production in many cases than standard tools used on the same jobs. Records of increased production range from 50% to 1500%.

The exclusive integral valves on Senacon Air Motors make it possible to automatically synchronize all power operations on such installations. Send for new bulletin TE-12 that proves the endless versatility of Senacon Air Motors.



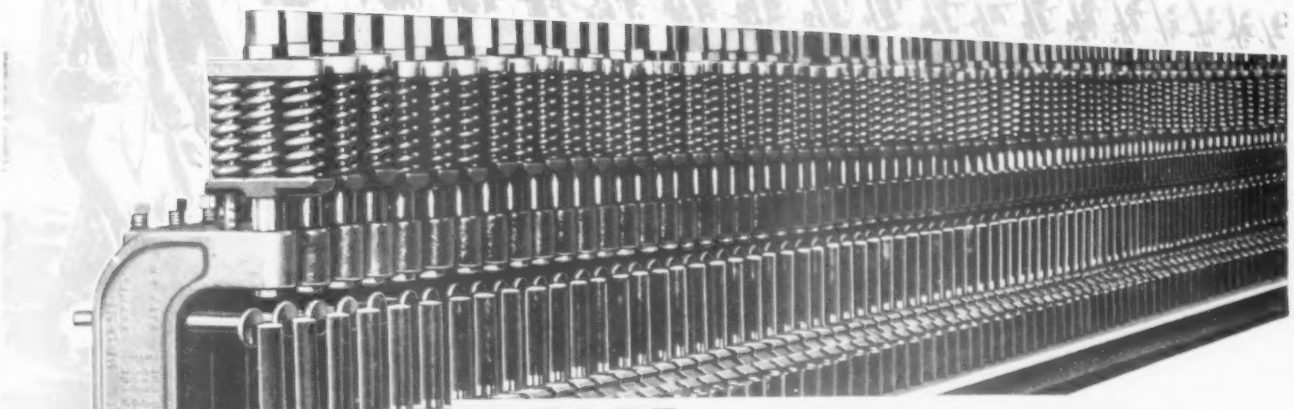
385 CUTS PER HOUR ON 2" TO 5" SECTIONS OF 17 S.T. DURAL. Two Senacon Air Motors made this wood saw into a highly efficient cutter and reduced blade breakage 1200% over hand operation.

SMITH-JOHNSON CORPORATION
Bendix Bldg. • Los Angeles, California

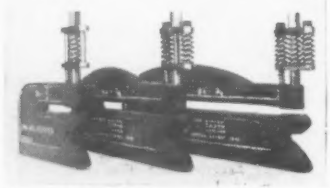
PNEUMATIC MACHINE *Senacon* TOOL DEVICES

SPEED PRODUCTION WITH AIR POWER

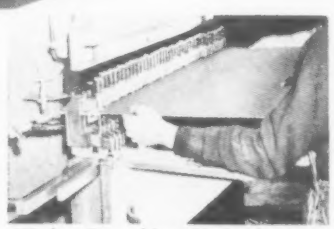
SHOULDER TO SHOULDER



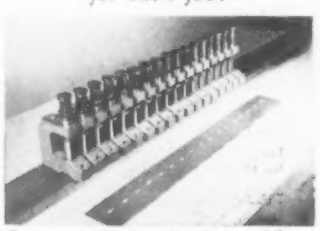
WALES PUNCHING UNITS ARE IN THE SERVICE, TOO!



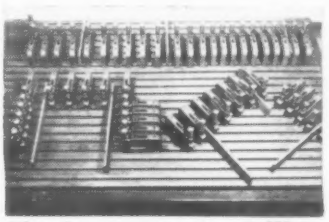
"Selective Strippers" of 1, 2, and 3 interchangeable springs provide exact stripping action for each job.



Wales Punching Units in operation. Note nothing is attached to press ram.



Gang of Wales Units on press brake rail. Note oblong holes.



Showing 3 set-ups of Wales Units on one T-slotted plate.

FEATURES OF WALES HOLE PUNCHING UNITS

Nothing is attached to press ram.
Self-contained punch and die holder.
Punch and die always in perfect alignment.
Each individual holder can be removed or reset on rails, templates, or T-slotted plates instantly.
Punches, dies, guides, and strippers can be removed from holders quickly.
Interchangeable punches and dies punch various sizes and shapes with the same holders.
Scattered and straight line patterns can be punched with Wales Units.
Makes possible sliding one set-up out of the press, and another pattern into position ready to continue press operation.
Cuts die-setting time from hours to minutes.
Provides patterns unlimited.

No longer are valuable months required for tooling up to perforate sheet metal on mass or short run production schedules. Wales Hole Punching Units are always ready to punch more holes faster by simply locking them into position on the bed of presses or press brakes. It's only a matter of minutes.

Such rapid change-overs of patterns increase production and speed delivery of vital war materiel to all United Nations fighting fronts. That's why leading metal fabricators are using Wales Hole Punching Units in their production for victory program. Yes, Wales Units are today's Production Line Soldiers.

All the exclusive die developments built into Wales Punching Units are in keeping with the progressive Strippit policy—"There's Always Something New in the Wales Line."

Keep pace and keep posted by writing today to—

THE STRIPPIT CORPORATION

345 Payne Avenue

North Tonawanda, N. Y.

George F. Wales, President

Specialists in Punching and Notching Equipment

Which IS THE RIGHT PLAN-O-MILL FOR YOUR JOB?

THESE TWO BOOKS MAKE SELECTION EASY!

● Small part or large, cumbersome part? Is it a threading or a cylindrical forming operation? Is extreme accuracy required, yet would you prefer to use unskilled or semi-skilled labor? Do you want maximum production *plus* maximum tool life?

If your answer is "yes" to any of these questions, then Plan-O-Mill is your machine. The particular model you choose depends on the size of your work. Generally speaking, for parts up to 8" work diameter and relatively short lengths, you should use Plan-O-Mill Number 3; for larger parts, use Number 5.

Complete information is contained in these catalogs, available without charge to executives. Write your nearest Plan-O-Mill representative.

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PLAN-O-MILL

HERE'S SOMETHING TO HELP YOU *Clear the Air*

HANDBOOK OF SPECIAL STEELS

Newly revised and reprinted—a comprehensive book on the properties, uses, and best methods of handling, treatment, etc. of tool, stainless and other alloy steels. Plenty of tables to facilitate quick reference and selection. 128 pages, pocket-sized, latest data.

ELEMENTARY DISCUSSIONS: TOOL AND STAINLESS STEELS

Informative booklets giving clear, detailed data on the various types of tool and stainless steels, their properties and handling. Excellent for training courses in metals and metalworking.

THE lack of information can throw a pretty effective smokescreen around jobs on the production lines. After all, it's about the same as on the firing line—you can't hit them if you can't see them.

Your plant is probably no exception to the general run of war producers. All have a steady job on their hands of training a stream of new men and apprentices in specialized machine operations or other fabricating procedures. Where the needed information concerns alloy steels, you'll find invaluable the publications listed in the panel to the left.

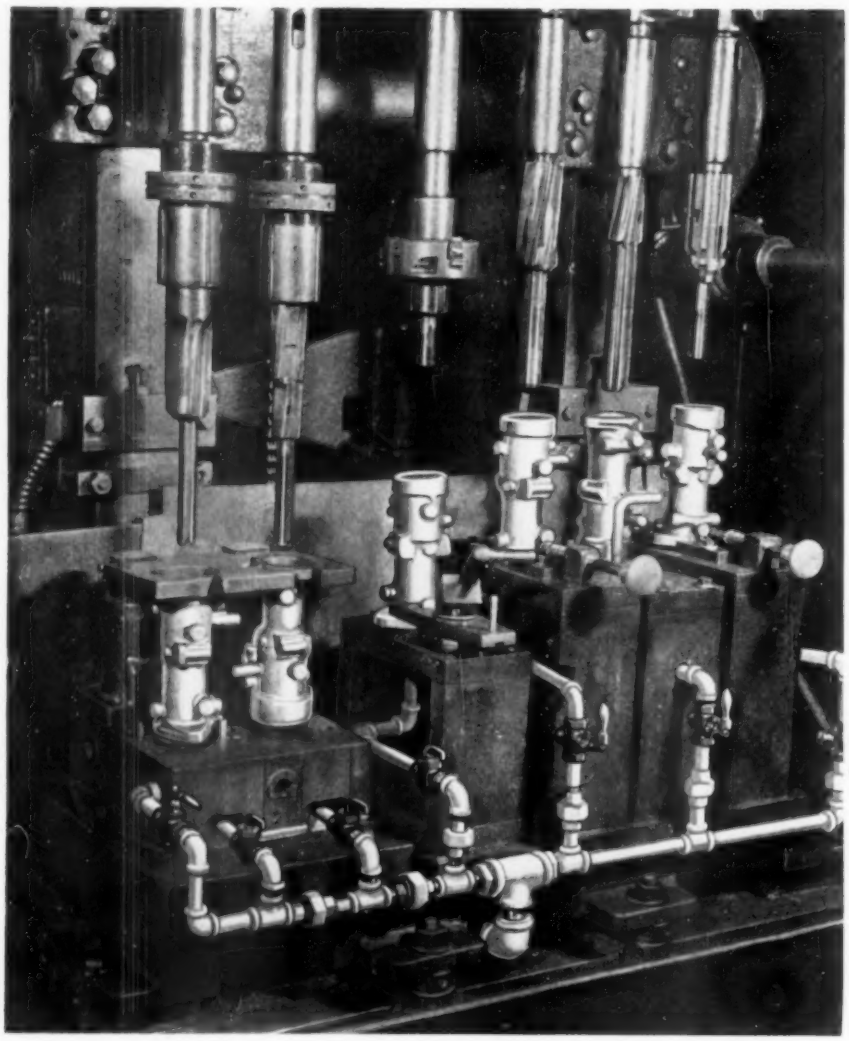
They're primarily for production men. For engineers and designers, complete and certified technical data on the various types of stainless and tool steels is available in Allegheny Ludlum "Blue Sheets." ● Write for the information or the personal assistance you need.

Allegheny Ludlum
STEEL CORPORATION
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

A-8677 . . . W & D

No Locking of Parts to be Machined with this NEW MACHINING METHOD

PREVENT ECCENTRIC HOLES • PREVENT SCORING



Here are new machining methods devised to eliminate some of the problems found in boring, drilling, and tapping operations.

The first is a *coolant system* in which the oil is forced through the hole being machined from the bottom—if hole is not cast, a hole is drilled from the bottom.

This method will prevent scoring or gouging and keep the tool cool. To prevent oversize or eccentric holes, the second new method has been devised which is a special fixture.

This fixture contains a floating piece for the oil to flow through. It allows horizontal movement and permits work-piece to stay in perfect alignment with the boring tool. No locking of parts with this fixture!

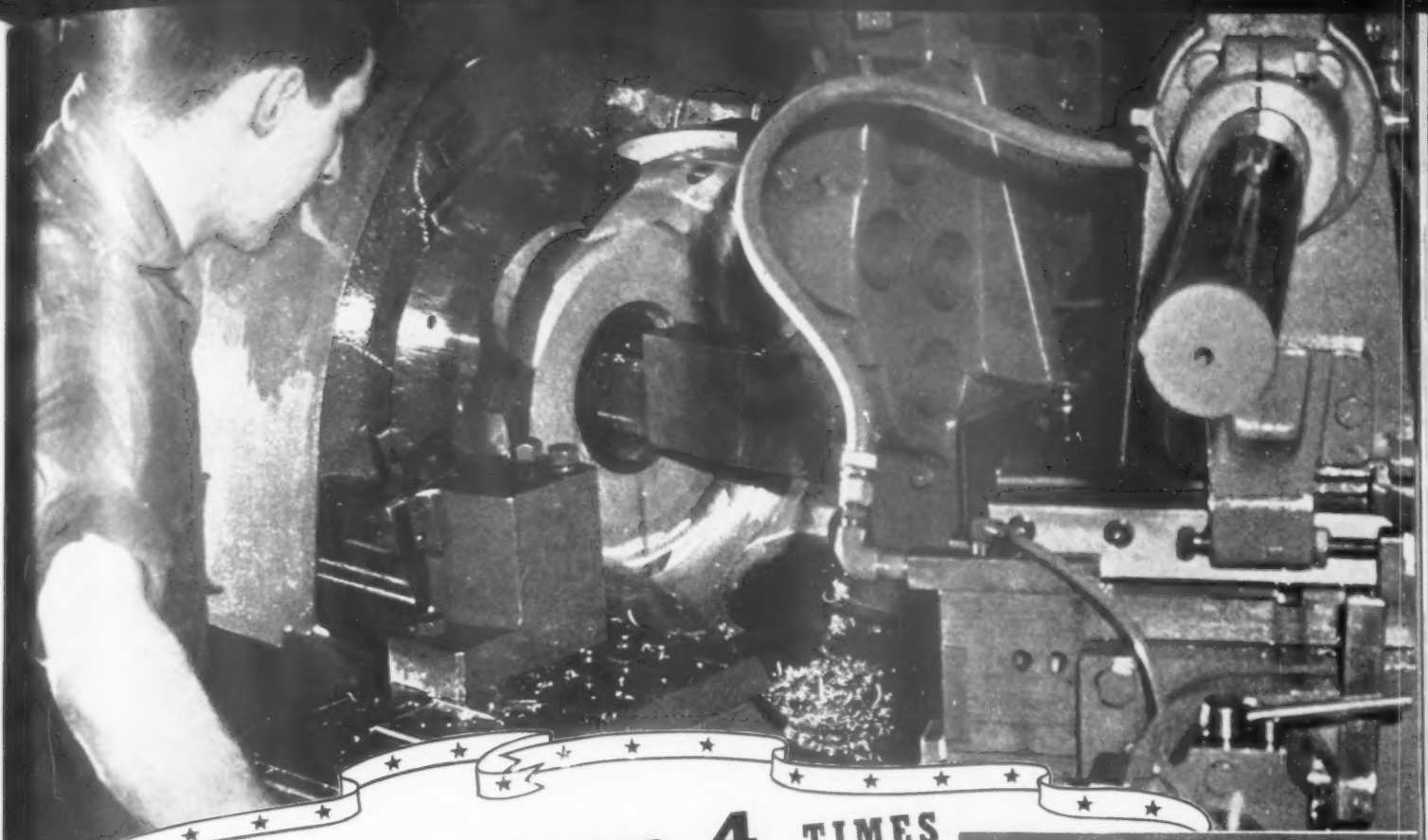
● Illustration shows these new methods applied to an old Moline Hole-Hog machine, quite worn, doing accurate work. This system can also be used on the latest machinery with a big advantage over present machining methods.

★ Write for the complete details concerning the use of these new methods in war work. Greatly speeding up production, the system is useful for machining large bores, such as engine cylinders, hydraulic cylinders, as well as small holes.

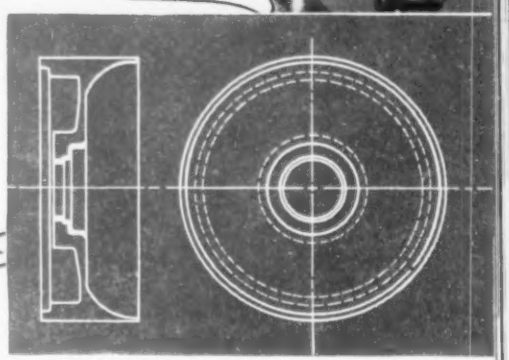
★ The above methods are protected by United States Patents No. 2,272,271 and No. 2,295,856. However, machine builders and manufacturers will be given a free license to use these methods for making war materials by writing to this concern.

MALLORY ELECTRIC CORPORATION

FULLERTON & CLOVERDALE AVENUES **DETROIT, MICHIGAN**



PRODUCTION INCREASED 4 TIMES WITH A FASTERMATIC



Airplane Engine Crankcase Section Machining Time Cut from 86 to 20 Minutes

Five machining operations, including boring, facing and forming, are performed as shown on above drawing. The part is made of aluminum, and precision tolerances must be held on all surfaces with fine finish. Floor-to-floor time is now 20 minutes per piece.

This is another of many examples of faster production achieved with a Foster "Fastermatic" Universal Automatic Turret Lathe. Designed mainly for accurate and high production machining, Foster "Fastermatics" are also efficiently applied to small lot work. The machines are equipped with a hydraulic feed system that is automatically controlled by standard feed cams, which may be reset easily from one job to another. Spindle speeds are also automatically controlled by hydraulic-operated clutches, and speed changes may be made at any time during the cut or on the forward rapid traverse to keep tools cutting at their maximum efficiency.

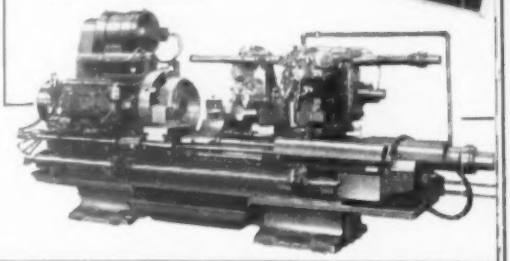
The entire machining cycle is automatic, and each operation is carried out at the most efficient rate as determined by the material being cut and type of cutting tools used. The machines are pace setters, and the operator has only to load and unload the work. In actual operation one operator can usually run two or more "Fastermatics," depending upon the time required for the machining cycle.

If you are using hand-operated turret lathes for chucking work, you will find that Foster "Fastermatics" will produce much more rapidly and economically. Foster Engineers will be glad to estimate the savings that you can make by switching to "Fastermatics." Your request for this information does not obligate you.

FASTERMATIC DATA

MATERIAL—Aluminum.
HOLDING METHOD—Chuck—Work Located on hub.
TOLERANCE—±.0005″ on Thickness of Hub.
SPEEDS—All 5 Operations—140 r.p.m.
PRODUCTION—20 Minutes Floor-to-Floor.
SAVINGS—66 Minutes per Piece.

FREE Write for the new "Fastermatic" Catalog. Learn about the outstanding time-saving features of these highly productive, automatic "Fastermatic" Turret Lathes. Write to Foster Division, 1104 Beardsley Avenue, Elkhart, Indiana.



INTERNATIONAL MACHINE TOOL CORPORATION

FOSTER DIVISION, ELKHART, INDIANA · LIBBY DIVISION, INDIANAPOLIS, INDIANA

MAIN OFFICE AT ELKHART, INDIANA

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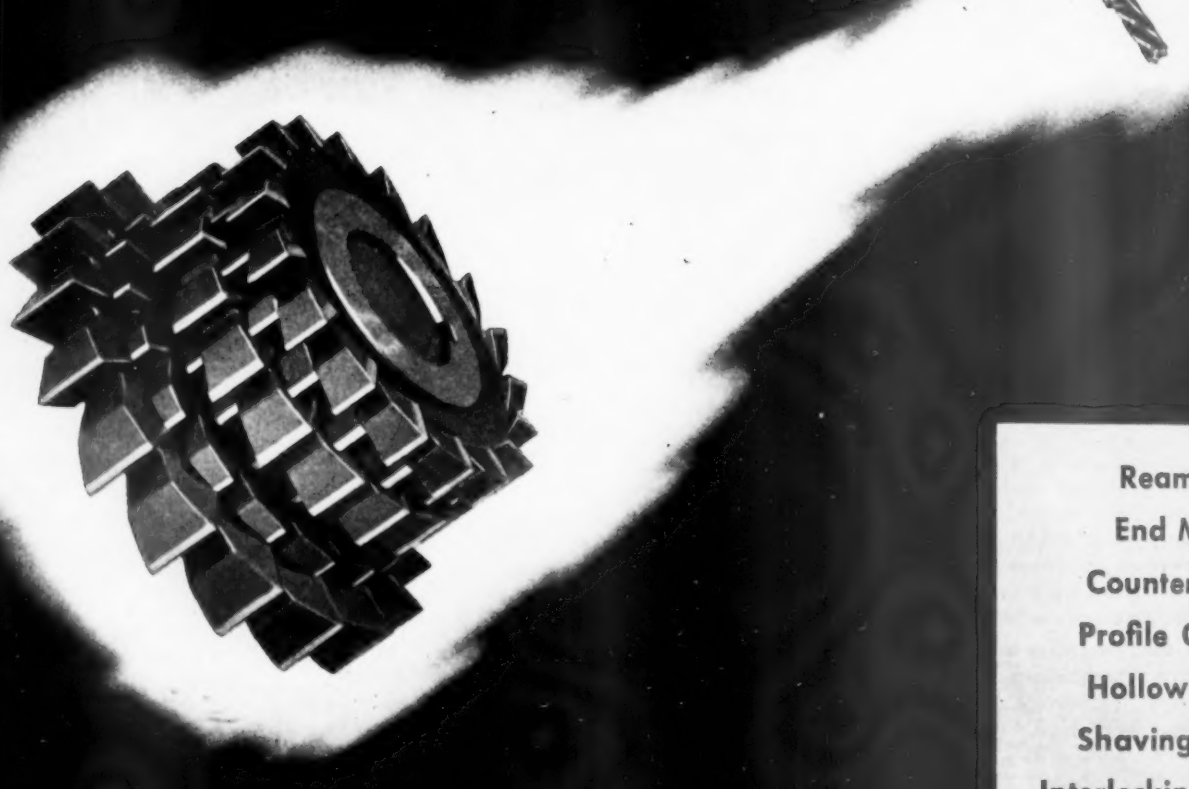
SUPERFINISHING MACHINES · BARKER CHUCKS · UNIVERSAL RAM TYPE TURRET LATHES

"SPECIALS" On Time

SPECIAL PRECISION CUTTERS OF HIGH-SPEED STEEL
for
AIRCRAFT — GUN — WAR INDUSTRIES



To meet the demands of the war program — ON TIME — C & W is constantly expanding plant capacity. C & W is one of the largest producers of special high-speed precision cutting tools — and has an outstanding record in meeting promised delivery schedules.

Write for illustrated pamphlet — Consult us on your tool requirements

- Reamers
- End Mills
- Counterbores
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- Hollow Mills
- Shaving Tools
- Interlocking Cutters
- Tapered Reamers
- Gun Drills
- Countersinks
- Milling Cutters

C&W TOOLS

C & W TOOL COMPANY

19 Chestnut Street, Cambridge, Massachusetts

NEW YORK PHILADELPHIA DETROIT

FOR OVER 30 YEARS — QUALITY PRECISION CUTTING TOOLS

AUTOMATIC CHUCKING EQUIPMENT

. . . Steps up Defense Production

Proved and demonstrated for fast production and accuracy on parts for peace-time needs, POTTER & JOHNSTON equipment was ready for the urgent needs of Defense industries.

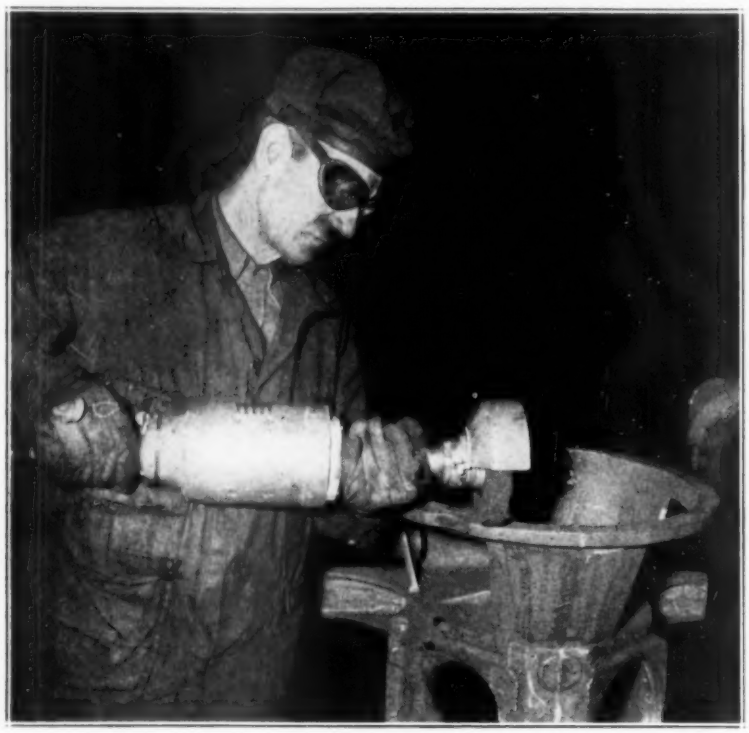
For example, P&J machines are contributing to the realization of unprecedented output of airplanes, aircraft engines, tanks, Bofors guns, anti-aircraft guns, machine guns, adaptors for shells and the American-made Oerlikon gun.

Potter & Johnston is utilizing every facility to help speed the war effort. We are indeed happy to be able to place our many years experience in the development of automatic chucking equipment at the disposal of our armed forces through the metal working industry.

The POTTER & JOHNSTON MACHINE CO

PAWTUCKET . . . . . RHODE ISLAN

60-CYCLE GRINDER MAINTAINS SPEED UNDER LOAD



↑ **POWER AND LIGHT WEIGHT** distinguish the 60-cycle squirrel cage induction type motor of CP-460 Grinders and Sanders and insure high sustained speed under all degrees of grinding loads encountered in general purpose grinding and sanding.

NEW CP TOOL COMPARES WITH HICYCLE GRINDERS IN EFFICIENCY AND ECONOMY

Low Maintenance — No Armatures, Commutators, Brushes

NEW YORK (CP)—Ideal for plants whose operations do not warrant the installation of high frequency tools—or plants that do have such tools but lack the high frequency power lines at points where additional tools could be advantageously used, the new CP-460 Grinders and Sanders afford fast, uniform grinding and sanding. These tools have a powerful, efficient, light-weight induction motor of the same type as the well-known CP Hicycle Grinders but operate on 60-cycle, 3-phase, 220-volt A.C. circuits. This motor insures high sustained speed under load.

The absence of commutators, brushes, brush holders, armatures, etc. and use of a special sturdily constructed rotor with low slip characteristic, provide heavy-duty production tools that are considerably lower in maintenance cost than the universal type of grinders and sanders. Write for complete details.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 E. 44th St., New York, N. Y.

↑ **COOL-RUNNING MOTOR** at all load speeds is assured by the coordinated ventilating system incorporated in CP-460 Grinders. Large intake and exhaust holes and efficient fan insure ample airflow for effective cooling.

NO ABRASIVE DUST can injure coil insulation of the new CP-460 Grinders and Sanders, due to ↓ rubber-covered stator winding and positive seal of vital parts.

↑ **STRONG, SILENT HELICAL GEARS** throughout (spiral bevel gearing on the right angle tools), with ball bearings of felt seal type, mounted on steel inserts cast integral, assure long-time service from CP-460 Grinders and Sanders.

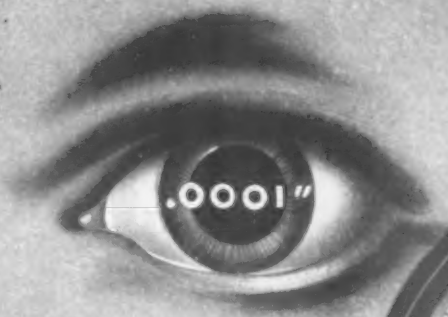
CHICAGO PNEUMATIC

ELECTRIC TOOLS

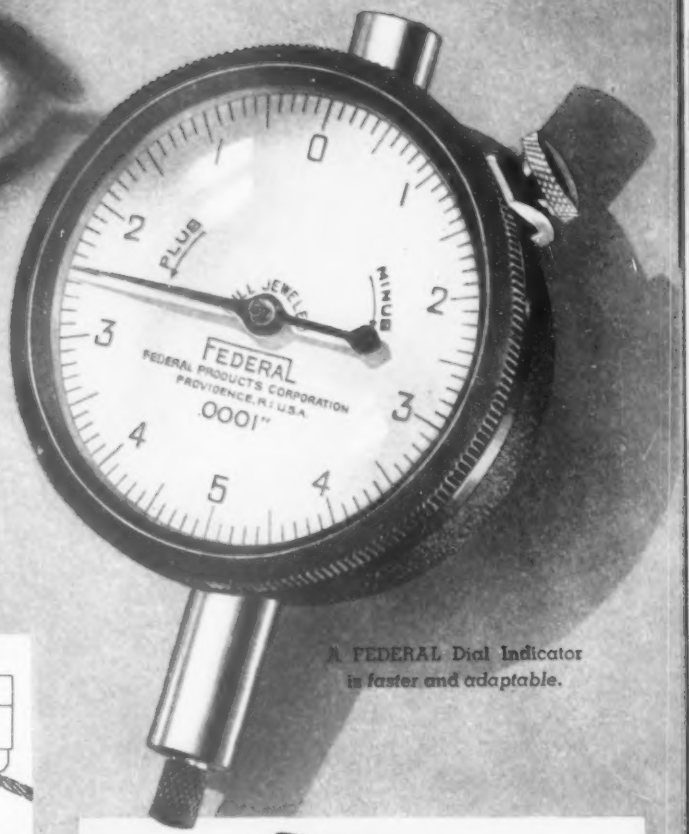
ALSO: Air Compressors, Pneumatic Tools, Hydraulic Aviation Accessories, Diesel Engines, Rock Drills

HICYCLE and UNIVERSAL
Drills
Reamers
Nut Runners
Screw Drivers
Grinders
Sanders
Tappers

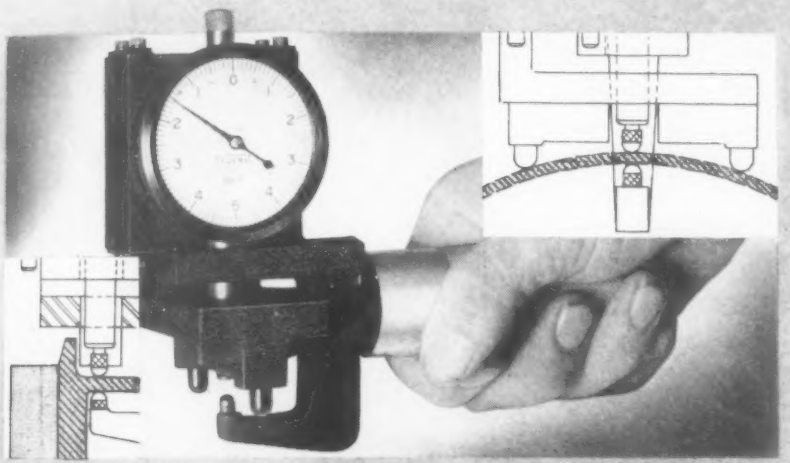
how to see faster



Many inspectors and tool designers still think that Dial Indicators should be used only on the most accurate work. But, Dial Indicators tell you the facts about a dimension much *faster* than old hand type gages. Your sense of sight is much more positive than your sense of touch. A Dial Indicator is also more adaptable. See gages below.

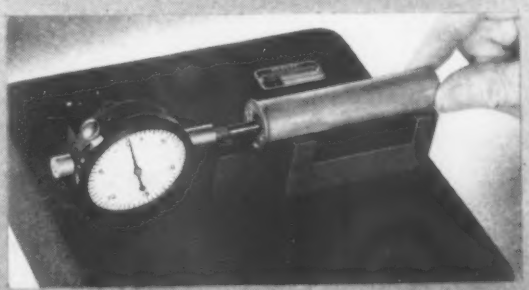


A FEDERAL Dial Indicator is faster and adaptable.



Notice how *quickly* this gage locates itself perpendicular to the tangent of the ring, which is being inspected for thickness. No rocking, but positive, sensitive and fast.

A simple gage—*but fast.* No old style flush pin gage will tell you the depth of the primer cup as fast and so positively.



The above illustrations are only typical of thousands of ways in which Federal Dial Indicator Gages are supplementing old-fashioned ways of gaging. They should be considered because of their speed and adaptability in comparing dimensions. Our deliveries may surprise you.

Can you imagine any other gage which will tell you whether the inside diameter of this ring is right or whether it is round, as *quickly* as this gage will?

FEDERAL PRODUCTS CORPORATION
PROVIDENCE, RHODE ISLAND

★ ★ ★ ★ ★ **FEDERAL** ★ ★ ★ ★ ★

PRECISION MEASURING INSTRUMENTS

Chicago • Cleveland • Detroit • Hartford • Los Angeles • Milwaukee • Montreal • Muncie
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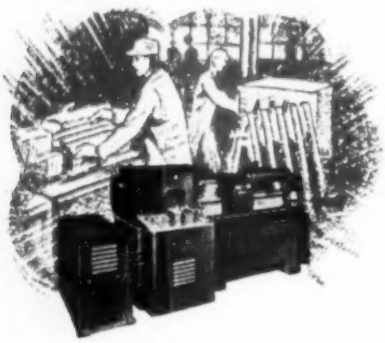
OUTSTANDING ACHIEVEMENT

"An inspiring contribution to the future of the country . . . a high standard of practical patriotism." With those words, the Under-Secretary of War awarded Lipe-Rollway workers the Army-Navy "E" for "outstanding achievement in producing war equipment."

"Outstanding Achievement" is a crowning distinction to Lipe-Rollway employees. For 67 years, their trained skill and brains have been an outstanding aid to invention and industry, and have contributed much to the unbeatable productiveness of America. And their 67 years of "know how" are carefully fostered and improved, passed from master worker to apprentice until it becomes a habit, a tradition, a day-by-day routine that carries on in peace as well as in war . . . *practical patriotism* that never stops trying to do something better, faster, and at lower cost.

★ LIPE Clutches



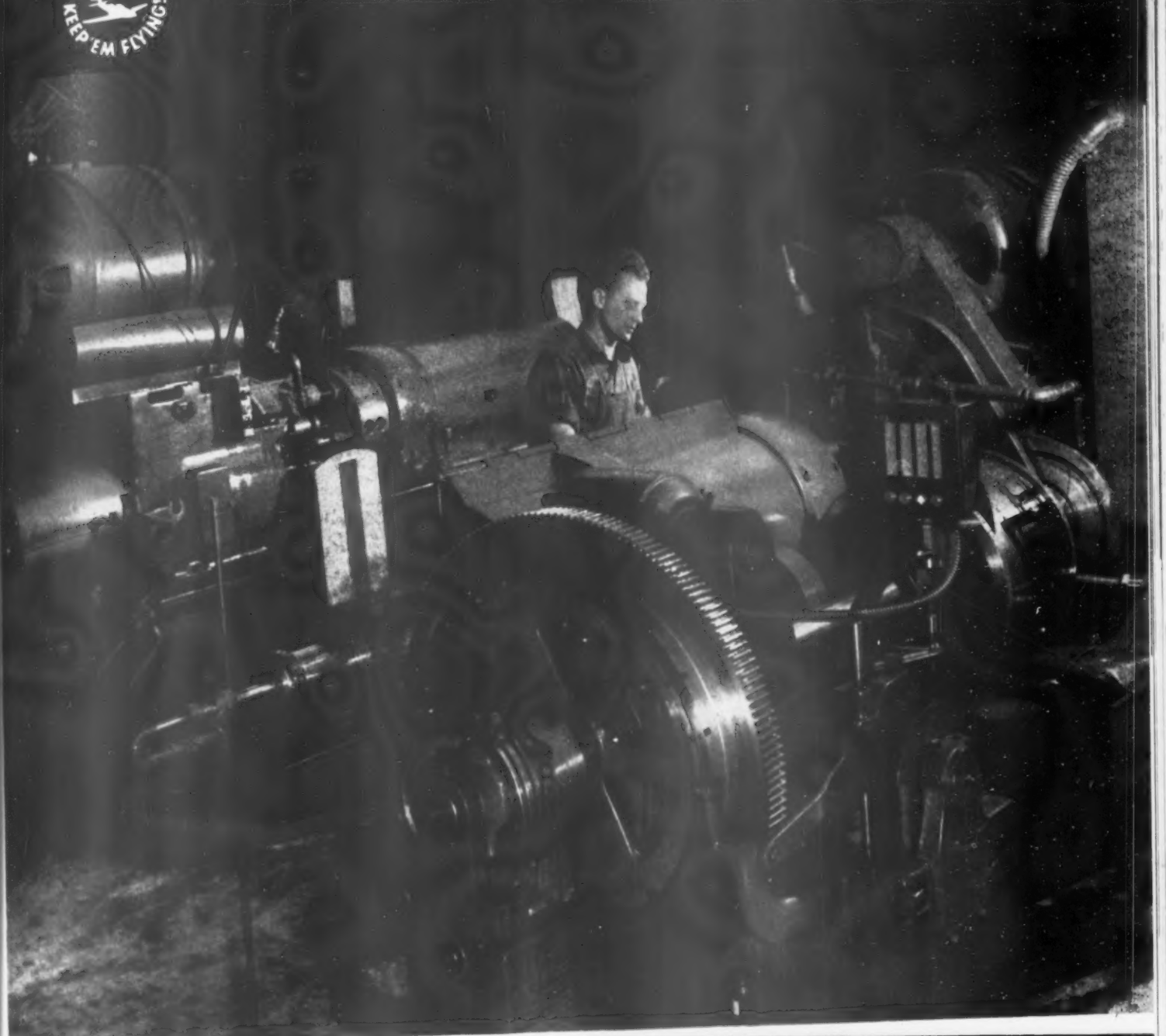
★ LIPE Lathes

LIPE ROLLWAY CORPORATION

Syracuse, N. Y.

★ ★

CLEVELAND *Single Spindle* AUTOMATICS CUT COSTS 28%, SAVE 30% TIME, ON GEAR BLANKS FOR KEARNEY & TRECKER CORPORATION



• Here are two 5¾-inch Cleveland *Single Spindle* Automatics in the plant of one of America's most famous machine tool builders—Kearney & Trecker Corporation. Machine tool builders are especially exacting and particular in seeing to it that the machine tools they use live up to their basic purchase consideration—amortization of their cost within a reasonable, given time limit. • These 5¾-inch Cleveland Model A machines are recent additions to a large battery of Clevelands in this well-known plant. Model A in 3¾-inch to 8-inch sizes has 4-speed motor drive, universal camming and variable tool feed; in 1 1/16-inch to 2½-inch size, constant speed drive is standard, 2-speed drive optional at slight extra cost. Ask for more detailed information.

THE CLEVELAND AUTOMATIC MACHINE COMPANY
2269 ASHLAND ROAD, CLEVELAND, OHIO

Sales Offices at
Chicago, 565 W. Washington Street • *Detroit*, 540 New Center Bldg.
Newark, 702 American Insurance Bldg. • *Cincinnati*, 507 American Bldg.

CLEVELAND *Single Spindle* AUTOMATICS

MODEL A—Built in 1 1/16-inch to 9 1/2-inch capacities inclus
MODEL B—Built in 1 1/16-inch to 2 1/2-inch capacities inclus

Logan Speed Collet Chuck for the No. 850 Lathe or others with a $1\frac{1}{2}$" x 8 thread spindle nose. Capacity: $\frac{5}{8}$" round bar stock. Quick acting. Positive squeeze grip. No keys or wrenches needed.

The LA-3 Tailstock Assembly and the LA-13 Compound Rest Assembly (below) will permit the No. 850 Turret Lathe to be used also as a standard screw cutting lathe. The Tailstock Assembly must be ordered with lathe as it must be matched with headstock at factory

LOGAN NO. 850 MANUFACTURING TURRET LATHE

SPECIFICATIONS: 1. Swing Over Bed, 10". 2. Bed Length, $43\frac{1}{8}$". 3. Spindle Hole, 25/32". Capacity, $\frac{5}{8}$". 4. Preloaded Precision Ball Bearing Spindle Mounting. 5. Twelve Spindle Speeds, 30 to 1450 R.P.M. 6. Cross Slide Stroke, $3\frac{1}{4}$". 7. Six Position, Automatic Indexing Turret. 8. Stroke of Turret, $4\frac{1}{4}$".

FOR CONTINUOUS PRODUCTION OF SMALL PARTS

This new Logan Lathe is the answer to war industry's demand for a fine, small production lathe, in order that larger machines may be released for heavier work. With a maximum capacity of $\frac{5}{8}$" round bar stock, the No. 850 Logan Manufacturing Turret Lathe will turn out small parts with the same speed and accuracy as that of larger machines, and the investment is considerably less. Advanced design and engineering, combined with the same high quality standards that have characterized all Logan Lathes, are assurance of long and satisfactory service.

LOGAN ENGINEERING COMPANY • CHICAGO, ILLINOIS

Logan

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

THERE'S A REASON!

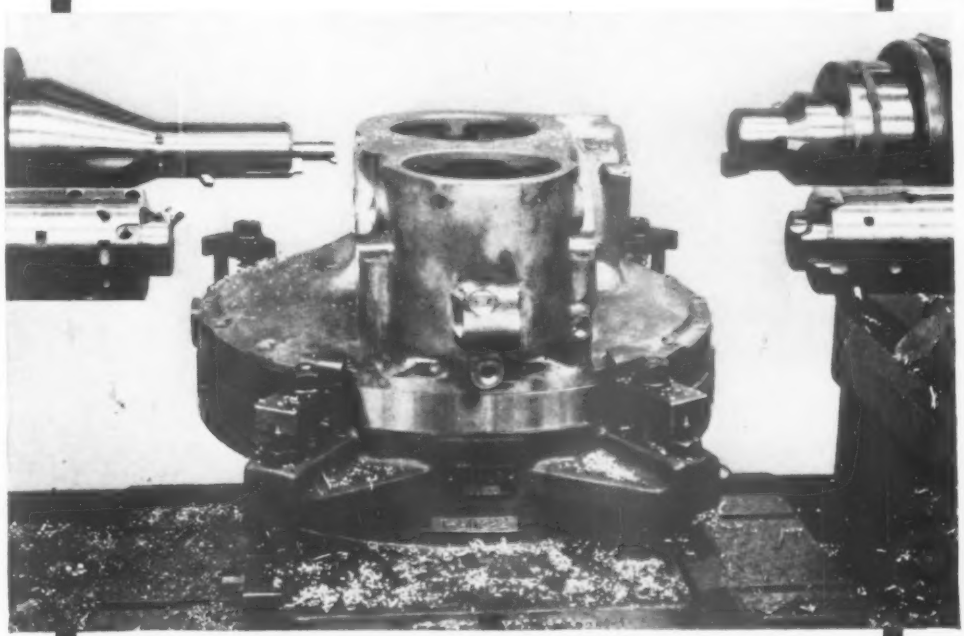
MORE THAN 100 AIRCRAFT PARTS ARE PRECISION FINISHED ON HEALD BORE-MATICS AND GRINDING MACHINES

There's a good reason, too, why leading aircraft manufacturers use Heald Bore-Matics and Heald Internal and Surface Grinding Machines for finishing the more than 100 aircraft parts listed here — that reason, in one word, is *precision*.

Every one of these 100 parts is a highly important aircraft component, every one represents a costly investment in vital craftsmanship and valuable materials, but all of them could be quickly reduced to mere scrap if improper finishing methods were employed. That's why finishing methods and equipment are so important in aircraft production.

The fact that the aircraft industry has chosen Heald Bore-Matics and Grinding Machines for precision finishing such a wide variety of aircraft components speaks for itself. And it's a mighty good reason that you, too, when you specify precision, specify HEALD.

Cylinders
Cylinder Muffs
Cylinder Healds
Crankcases
Lower Half Crankcases
Crankcase Sections
Crankcase Center Sections
Crankcase Front Sections
Rear Crankcase
Crankcase Covers
Intermediate Crankcase
Wheelcases
Volute Casings
Gear Cases
Reduction Gear Cases
Reduction Drive Supports
Front Covers
Oil Pumps
Bearing Supports
Rear Cam Supports
Master Rods
Articulating Rods
Pistons
Piston Pins
Crankshafts
Crankshaft Rear Sections
Crankshaft Center Assemblies
Crankshaft Dynamic Balancer Weights
Gears
Impeller Shaft Gears
Oil Pump Bodies
Oil Pump Covers
Fuel Pump Bodies
Oil Pump Scavenger Casings
Water Pump Casings
Master Rod Bearings
Crankshaft Bearings
Bushings
Master Rod Spacer Bearings
Valve Inserts
Valve Tappets
Valve Tappet Guides



ABOVE — Here a Heald No. 49 Double End Bore-Matic bores, faces and chamfers 21 surfaces in crank case rear covers made of magnesium alloy, all in one work setting.

Valve Spring Lock Washers
Valve Spring Washers
Carburetor Bodies
Spark Plug Parts
Magneto Housings
Magneto Breaker Adapters
Magneto Plate
Magneto Gear Housing
Distributor Gears
Distributor Blocks
Generator Frames
Generator End Shields
Boost Control Housings
Camshaft Brackets
Clutch Selector Housings
Crank Pin Oil Plug
Crankshaft Oil Plug
Fuel Pump Drive Shaft
Fuel Pump Drive Shaft Support
Gear Housings
Knuckle Pin Locking Plate
Push Rod Ball Ends
Regulator Housings
Roller Cams
Valve Housings
Valve Brackets
Valve Bushings
Control Motor End Shields
Selsyn Motor Stators
Hydraulic Operating Cylinders
Gun Synchronizer Bearing Liners
Tail Gear Treadle Assemblies
Propeller Blades
Propeller Blade Bushings
Propeller Shafts
Propeller Hubs
Propeller Shaft Bearings
Propeller Spiders
Propeller Cams
Propeller Hub Cones

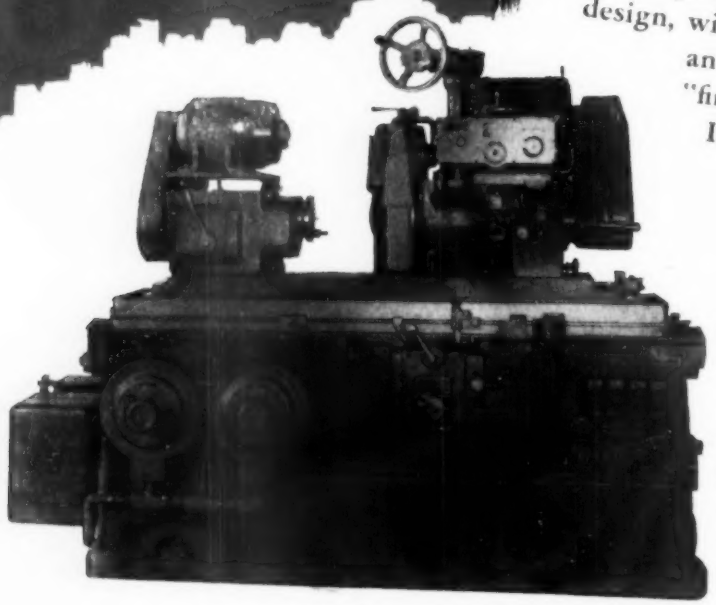
★ ★ ★ ★ ★ ★ ★

THE HEALD MACHINE CO. WORCESTER, MASS., U. S. A.

MANUFACTURERS OF PRECISION BORING AND PRECISION GRINDING MACHINES

A NEW FITCHBURG GRINDER

. . . . NEW AUTOMATIC PRECISION "TYPE B" PLAIN CYLINDRICAL GRINDER



NEW FITCHBURG "TYPE B"—10 inch
PLAIN CYLINDRICAL GRINDER

Fitchburg announces another new grinder—the Fitchburg "Type B" automatic precision Plain Cylindrical Grinder. Into this new "Type B" are built all the essentials of rigid construction for accurate work and fine finish.

This new Fitchburg "Type B" Grinder is equipped with a Standard Bowgage Wheelhead unit with complete automatic cycle—rapid traverse to work, correct feed, grinding dwell and rapid return. This grinder is of modern design, with all mechanisms readily accessible and ease of operation is assured by "finger tip" controls.

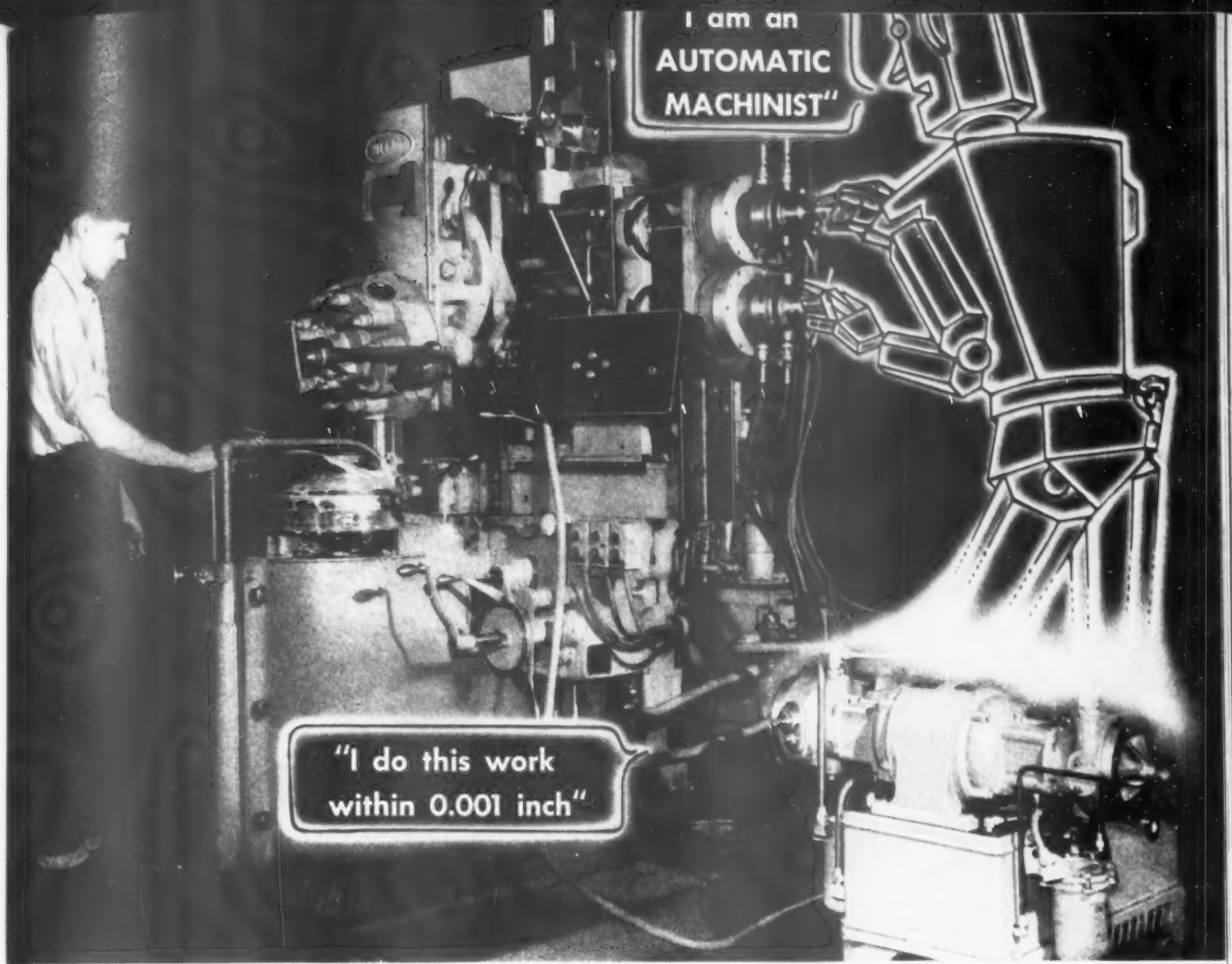
In every detail it fills a definite need for a plain grinder where a machine is wanted for general plain cylindrical grinding, in large or small lots, with assurance of accuracy and fine finish at low cost.

Write today for complete details and information about machines with 10″, 18″, 48″ and 72″ capacity.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of—Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.



Get this *AUTOMATIC*, ERROR-PROOF OPERATOR and get 7 TIMES MORE PRODUCTION from *your present standard* tool room tools.

A DUPLIMATIC will automatically turn one, or two, or three feed screws of almost any machine tool, automatically, simultaneously! It will permit almost any standard machine tool to be converted over to mass production contour machining at accuracies that will astonish you.

It is uncannily human, yet it operates with absolute certainty.

No human operator could possibly turn the two feeds on this vertical lathe to form-turn this ordnance part at required speeds of production and at the limits demanded. Yet DUPLIMATIC does it easily, accurately and at speeds that exceed the original specification.

DUPLIMATIC "FITS" ANY MACHINE

DUPLIMATIC Single, Dual or the three dimensional "Special"—can be quickly connected up with any standard tool room tool. A few hours to connect the drive heads to the feed screws; a few more to show the operator how simple DUPLIMATIC is to handle and *mass production at tool room limits has started!* An average of 7 times more production than with manual operation alone is the well-established record of DUPLIMATIC.

WHO USES DUPLIMATIC? The biggest producers of war goods use DUPLIMATIC: Pontiac, Cadillac, Chevrolet, Chrysler, DeSoto, Pullman and Pressed Steel Car, A. O. Smith—to mention just a few.

When your Pet Machinist gets drafted . . .
draft DUPLIMATIC

Send for complete details NOW!

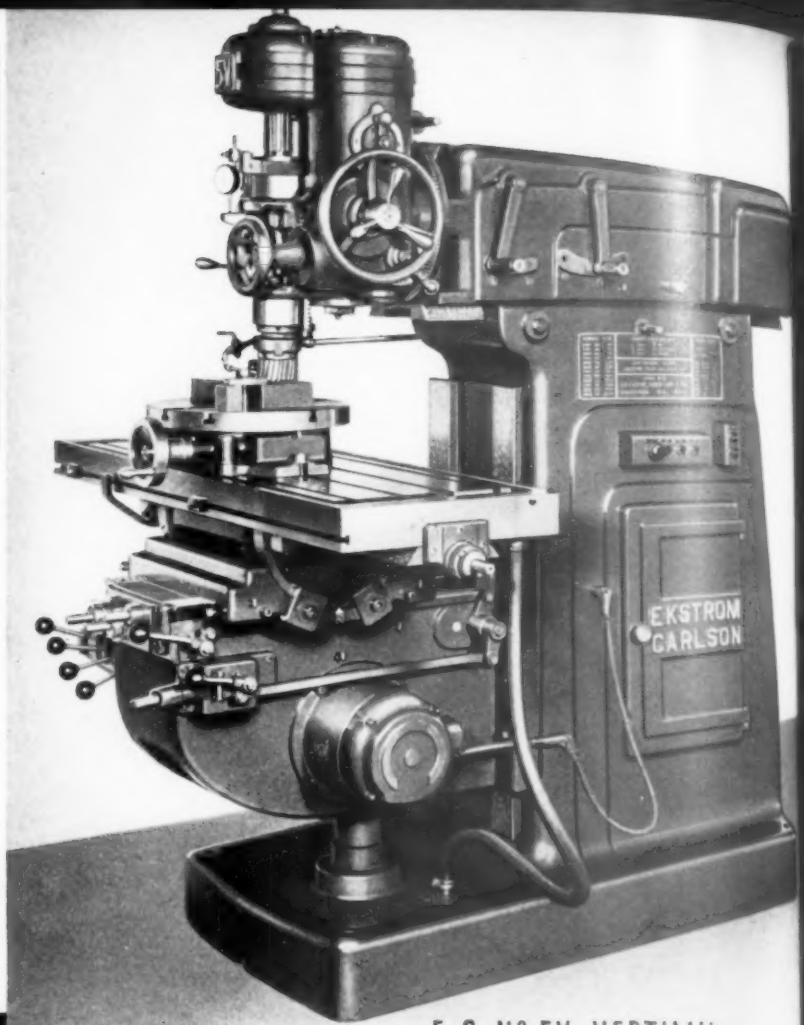
DUPLIMATIC
and your present tool room tools will do more contour machining faster, more accurately and with less skilled help.

DETROIT UNIVERSAL DUPLICATOR CO.

731 E. Milwaukee Ave. Detroit, Michigan

ESSENTIAL MACHINES

for Armament Manufacturers



E.C. Nº 5V VERTIMIL

E. C. No. V-109 ROUTERDRILL

E. C. No. 540 UNIVERSAL
ROUTING, MILLING and
DRILLING MACHINE

E. C. No. 30
RADIAL DRILL

Four E.C. Machines, packed with precision pouring out production to pound the Axis EVERYONE ESSENTIAL.

1. The E.C. 5V Vertimil has ram adjustment tilting table, swivel head, power spindle and table feeds. It's large capacity and great versatility make its use applicable to the nation's arsenals, ship builders, aircraft manufacturers, and the machine tool industry.

2. Speedy routing and drilling on large work with the E.C. No. V-109 Routerdrill. Has radial reach of 109″, can cover all points on 4′x12′ table. (Also made in the V-84 size).

3. Fast drilling on small parts with the E.C. No. 30 Radial Drill. Has radial reach of 30″. (Also made in 72″ size).

4. Universal capacity for non-ferrous routing milling, and drilling on the E.C. No. 540 also a time saver for the pattern shop for machining of wood and dural. (Furnished with V-Belt or flat belt drive).

Write for bulletins and prices.

EKSTROM-CARLSON CO.

2500 RAILROAD AVE.

ROCKFORD, ILLINOIS

Jarvis
POWER TOOLS

TAPPING ATTACHMENTS
GROUND ROTARY FILES
FLEXIBLE SHAFT MACHINES

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

WHY AMERICA HAS

Better FIGHTING TOOLS

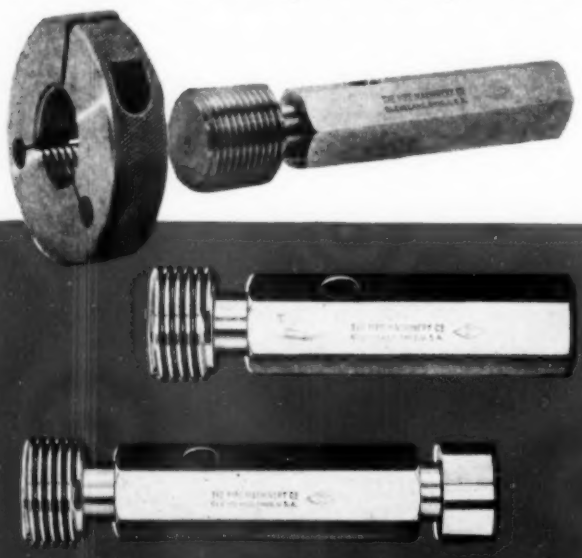
The mass production methods which are providing a constantly increasing flow of the tools of war—planes, guns, tanks and ships—for our allies and ourselves, require absolute uniformity and interchangeability of parts.

Gages are the tools of this precision manufacture—gages that possess *extreme* accuracy.

This company has been privileged to have an important part in the production of these gages. Advanced manufacturing and testing methods insure their initial accuracy. Extra care in finishing and hardening safeguard that accuracy through long periods of constant use.

All PM Gages are identified by the PM Diamond emblem. This is our definite promise to you that PM Gages will give you accurate production controls.

A new catalog of PM Gages—both standard and special—is now on the press. A request on your letterhead will bring you a copy.

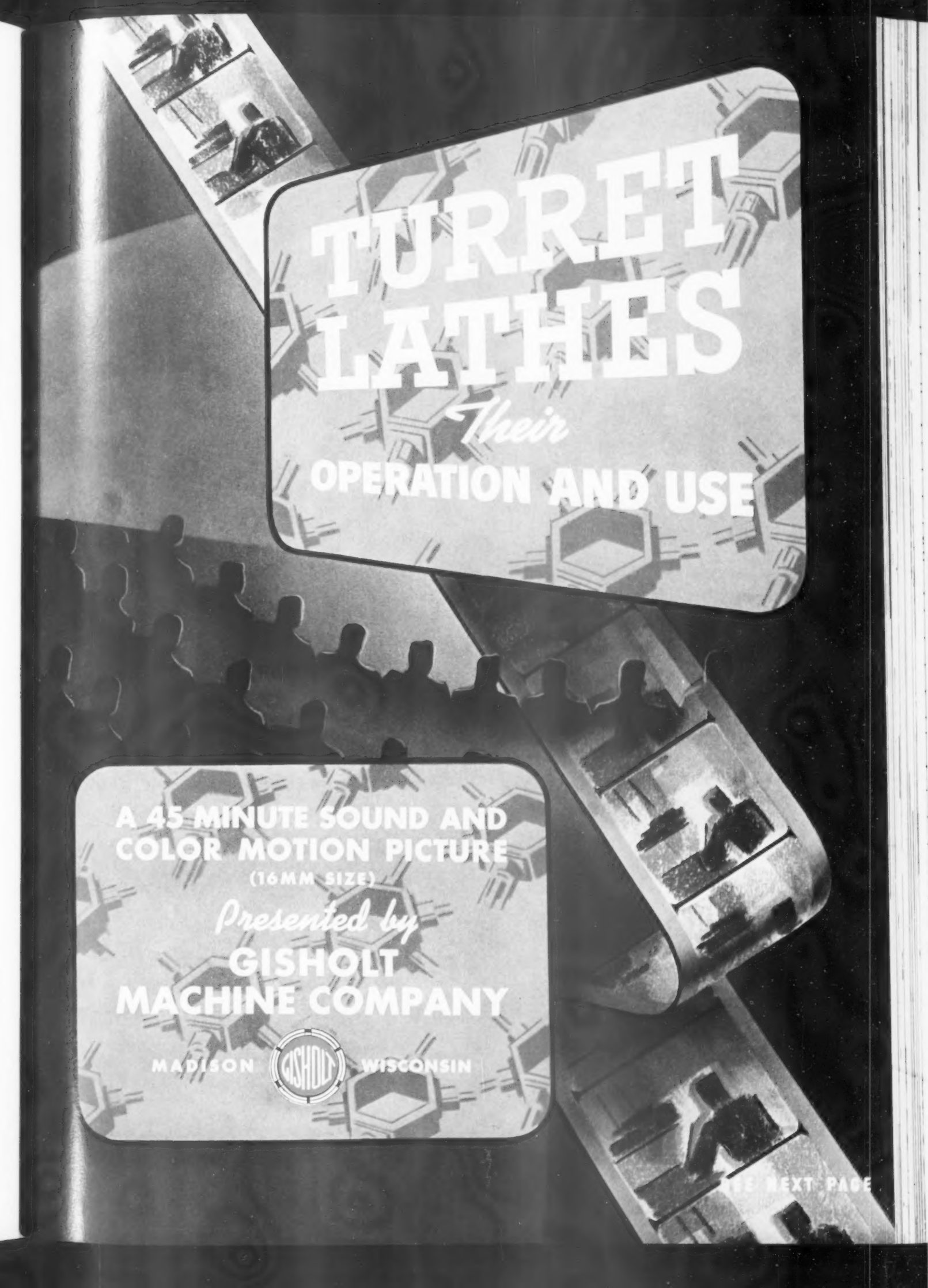


Stocks of standard PM Gages are maintained as complete as possible under present conditions, from which immediate deliveries can be made.

PM CO

The PIPE MACHINERY COMPANY Cleveland, O.

GAGES • CUTTING TOOLS



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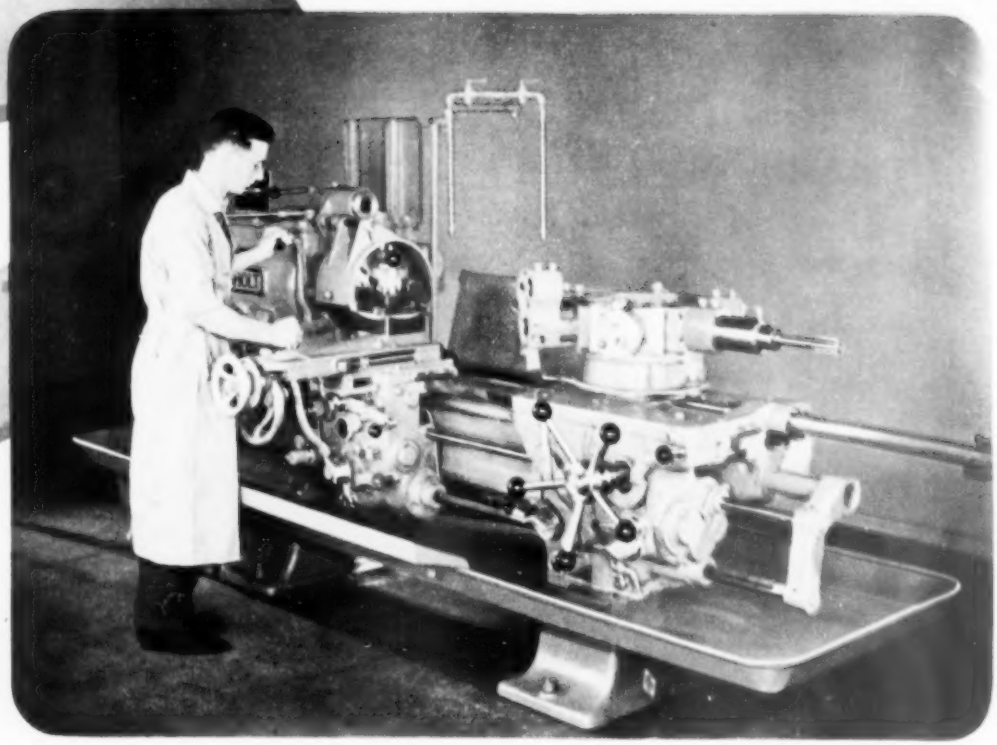
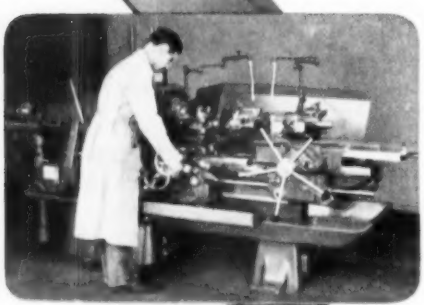
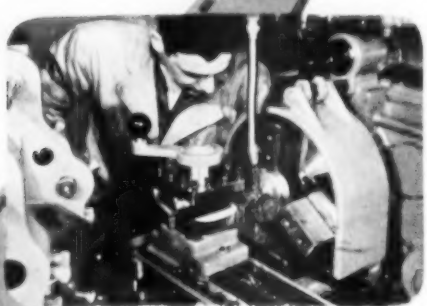


TO TRAIN TURRET LATHE OPERATORS

Faster





Produced by the Gisholt Machine Company in collaboration with Burton Holmes Films, Inc., this new sound-color film, "TURRET LATHES—THEIR OPERATION AND USE" shows the place of the turret lathe among machine tools, illustrates typical tooling set-ups, and outlines fundamental operations.

AVAILABLE FOR USE BY TRADE SCHOOLS, ETC.

To assist the war program with faster training through a better understanding of these turret lathe functions, this interesting and instructive film is loaned without charge to Army and Navy training schools, trade schools, colleges, industrial plants, apprentice shops, etc. Such recognized organizations are invited to write us for further information.

GISHOLT MACHINE COMPANY
East Washington Avenue • Madison, Wisconsin

TURRET GISHOLT LATHES

LOOK AHEAD... KEEP AHEAD... WITH GISHOLT IMPROVEMENTS IN METAL TURNING

Son...

HE has just turned eighteen. Shaves twice a week and maybe a hair or two is sprouting on his chest. He shies away now when his dad tries to be affectionate and we noticed some lipstick on one of his handkerchiefs after a country club junior dance not so long ago. But it seems only yesterday, perhaps it was the day before, that he was a chubby legged kid swinging from the arch of the doorway, leading to the dining room, in a gadget that was something like a breeches buoy and he was sucking at the end of a turkey bone.

He went back to school this Fall, a tall, athletic lad, budding into manhood, but there was something else on his mind beside the football and hockey teams or the little blonde girl with whom he had "palled" around during the Summer. It seems as though he was listening for a certain call—the Clarion call that poets sing about—and, perhaps we just imagined it, but we thought we saw an upward jutting of his chin, a certain light in his eyes, and a sort of a rearing-to-go expression in his face.

It chilled us a bit in the region of our heart, when we thought of his discarding the sports coat for the "O.D." of the Army or the blue of the Navy. There was a bit of a catch in our throat as we thought of his putting aside his football helmet for one of steel; of his hanging up his hockey stick and reaching for a gun. After all we still regard him as just a little boy.

They tell us that the eighteen and nineteen year old lads are to be called to the service. When that day comes to us there will be prayers, but no tears. We shall not mourn nor shall we be fearful. Rather there will come welling up from our hearts that warm feeling of pride that millions of other parents will sense when their beloved lads marched away. Our lad is no different than the others. We are no different than other loving parents, nor is our sacrifice any greater. They are going to make great soldiers, sailors, marines and fliers out of these youngsters. And they will become a mighty force when they take their places beside their brothers in arms. They too know what they fight for. They too know full well of the sacrifices that must be made before the evil powers that threaten the world can be overcome.

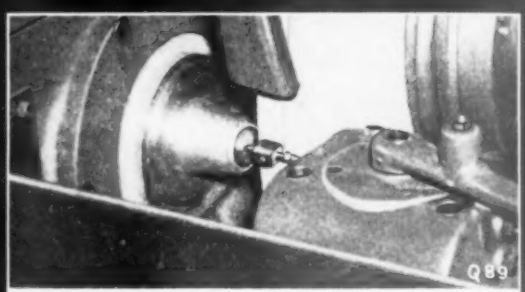
And let us not forget that they are counting on us. They know that we shall not fail them.

God be with them and their brothers.

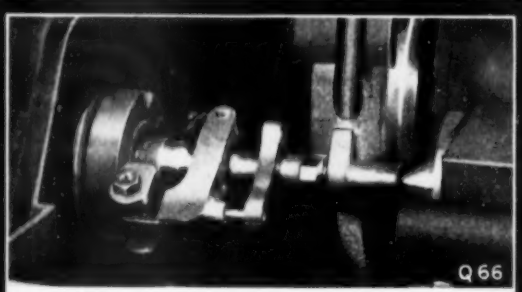
TO FINISH THE JOB QUICKER . . .

GRIND SMALL CAMS WITH EQUIPMENT LIKE THIS

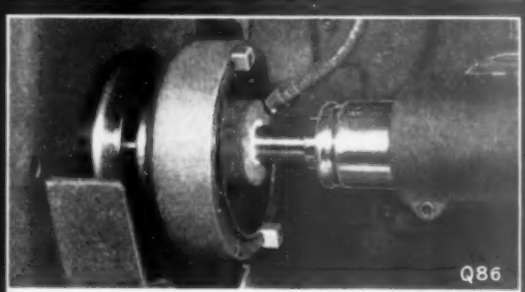
An ignition timing cam being ground on a Landis 6" x 18" Type C Plain Grinder using a [illegible] attachment.



A [illegible] being relief ground on a Landis 6" Type C Plain Grinder equipped with an [illegible] attachment.



A small integral cam being ground on a Landis 12" x 36" Type LC Universal. An integral cam grinding attachment is used.

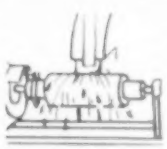


A cam used in the manufacture of aircraft being internal ground on a 12" Type LC Universal, using a [illegible] cam grinding attachment.

Why invest in costly specialized equipment for the grinding of small cams when you can perform the same operations on Landis Cam Grinding Attachments such as those shown above. When not in use, the attachment can be removed and the otherwise perfectly standard machine can be used for conventional operations.

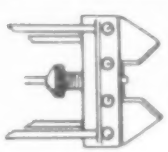
Unusual PRECISION LANDIS GRINDERS Performance as Usual

LANDIS TOOL CO. WAYNESBORO, PENNSYLVANIA.



FIRST TO USE A COOLANT SYSTEM AS INTEGRAL PART OF GRINDING MACHINE.

FIRST TO SUCCESSFULLY APPLY HYDRAULICS TO GRINDING MACHINES GENERALLY.



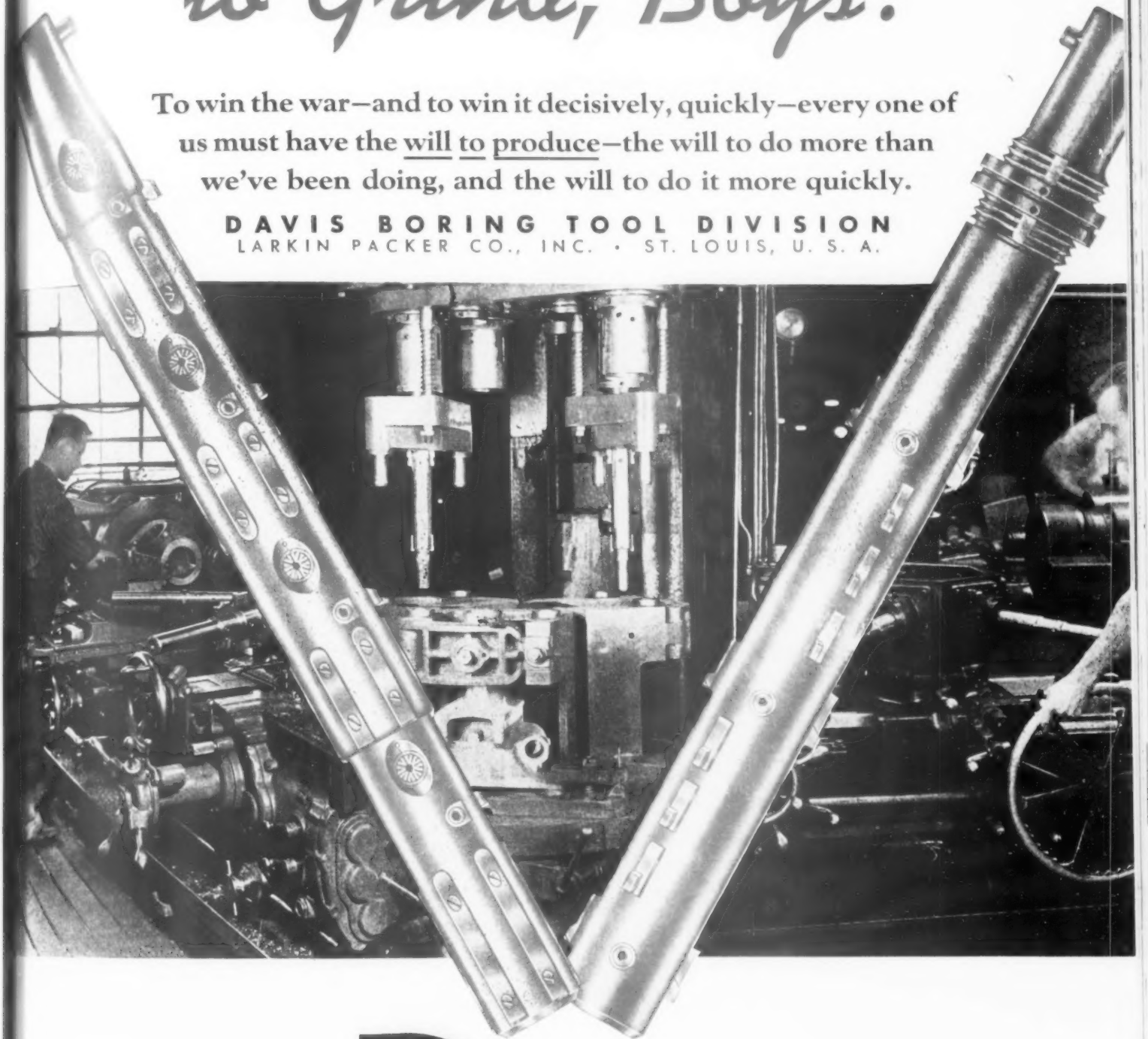
FIRST TO DEVELOP MANY NEW FEATURES SUCH AS LANDIS-SOLEX SIZING.

397

We've Got an Axis to Grind, Boys!

To win the war—and to win it decisively, quickly—every one of us must have the will to produce—the will to do more than we've been doing, and the will to do it more quickly.

DAVIS BORING TOOL DIVISION
LARKIN PACKER CO., INC. • ST. LOUIS, U. S. A.



DAVIS
BORING TOOLS

Another Tribute To The Super Smooth Finish and Accuracy of SUNNEN PRECISION HONING

● To aid them in living up to their slogan of "It Must Be Right," the Hydraulic Press Manufacturing Company has adopted Sunnen Precision Honing.

Replacing hand reaming, the Sunnen method not only saves time, but, in addition, makes possible close tolerances and a super-smooth finish.

To insure interchangeability of parts, we use Sunnen honing on our HYDRO-POWER Valves and Control Bodies.

— The Hydraulic Press Manufacturing Co.

The Sunnen Precision Honing Machine puts the finishing touch on internal bores of valve and control bodies, assuring a fine finish with holes that are straight and true.

You, Too, Can Profit by These Advantages—

If you are reaming or grinding internal cylindrical surfaces from .185" to 2.400" in diameter, this practical, inexpensive, accurate machine will help you speed up production, cut costs, and improve accuracy.

The Sunnen Precision Honing Machine does not require skilled labor—workers in "teens" can handle jobs in "tenths." Can be set up and work located in less than a minute. Accuracy within .0001" guaranteed. Corrects errors of out-of-roundness or taper caused by previous operations. Relieves big internal grinders for other jobs. Doesn't need fixtures—work is held in hand by operator. Provides simple, low-cost method for duplicating sizes.

Put Sunnen Precision Honing to work in your plant.

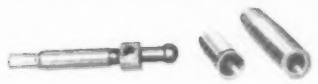
SUNNEN PRODUCTS COMPANY
7932 Manchester Avenue St. Louis, Missouri
Canadian Factory: Chatham, Ontario

SUNNEN

Send for FREE BULLETIN

—giving complete information. Or, if you prefer, a Sunnen Sales Engineer will demonstrate this equipment in your plant on your job.

Aviation Hydraulic Cylinder made of Aluminum-Alloy. Improves the quality of the bearing surface. An extremely smooth surface-finish is secured.



Airplane Engine Parts accurately honed to a super-smooth finish.

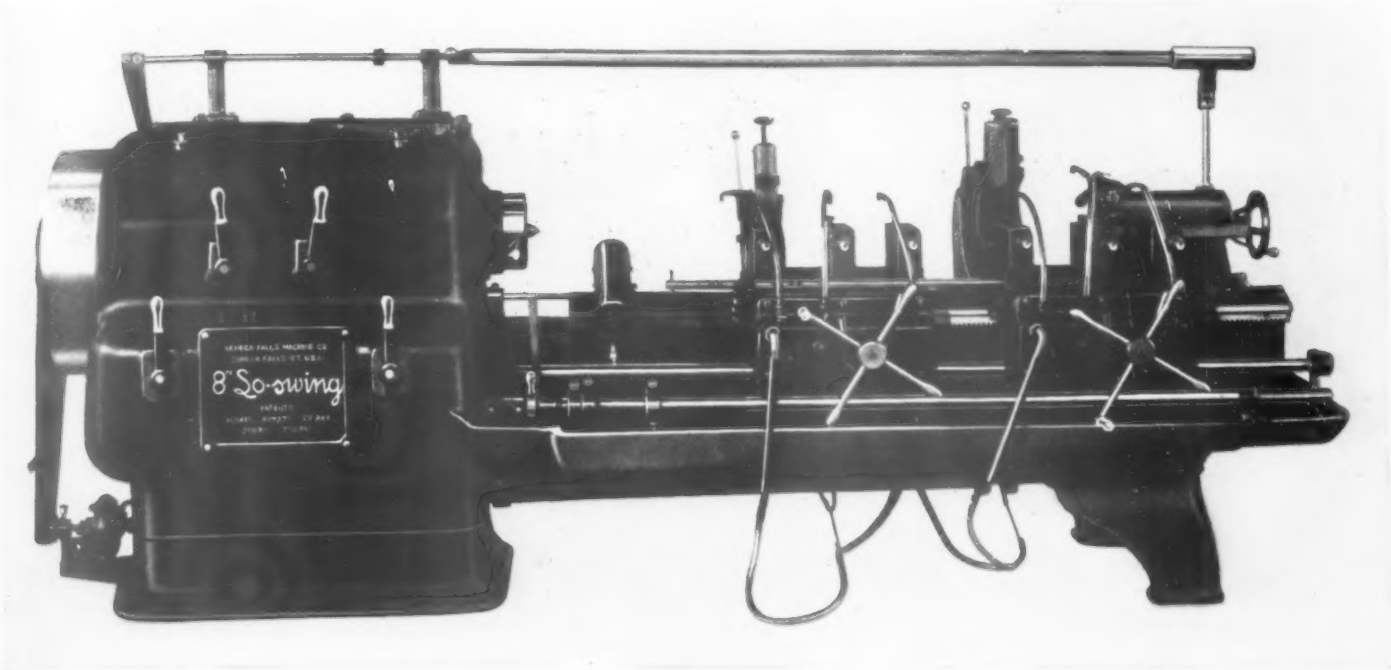
Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.

Aircraft Valve Tappet Roller. 4-Micro finish.

Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .00005 in."

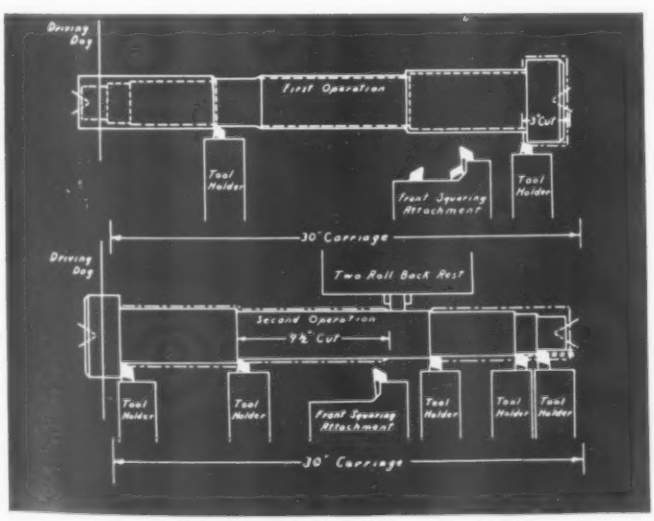
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



Turning Costs Reduced on Small Lots

OF HEAVY SPINDLES BY MULTIPLE TOOL SET-UP ON 8" *Lo-swing* LATHE



Tooling layouts for first and second operations.

PROBLEM: To reduce the cost of turning heavy spindles in small and medium lots.

SOLUTION: An 8" *Lo-swing* Lathe was selected, because it had plenty of power to take heavy multiple cuts and offered a method of quick set-up with multiple tools, thus minimizing the time required in changing over from job to job.

The tooling layout shows a typical spindle which is completely rough turned in two operations on the 8" *Lo-swing* Lathe, illustrated above. Machining time for the first operation was 11.2 minutes. Machining time for the second operation was 10.25 minutes. Set-up time required to prepare the machine for this particular job was 30 minutes.

LATHE NEWS from SENECA FALLS

A Light Still Burning

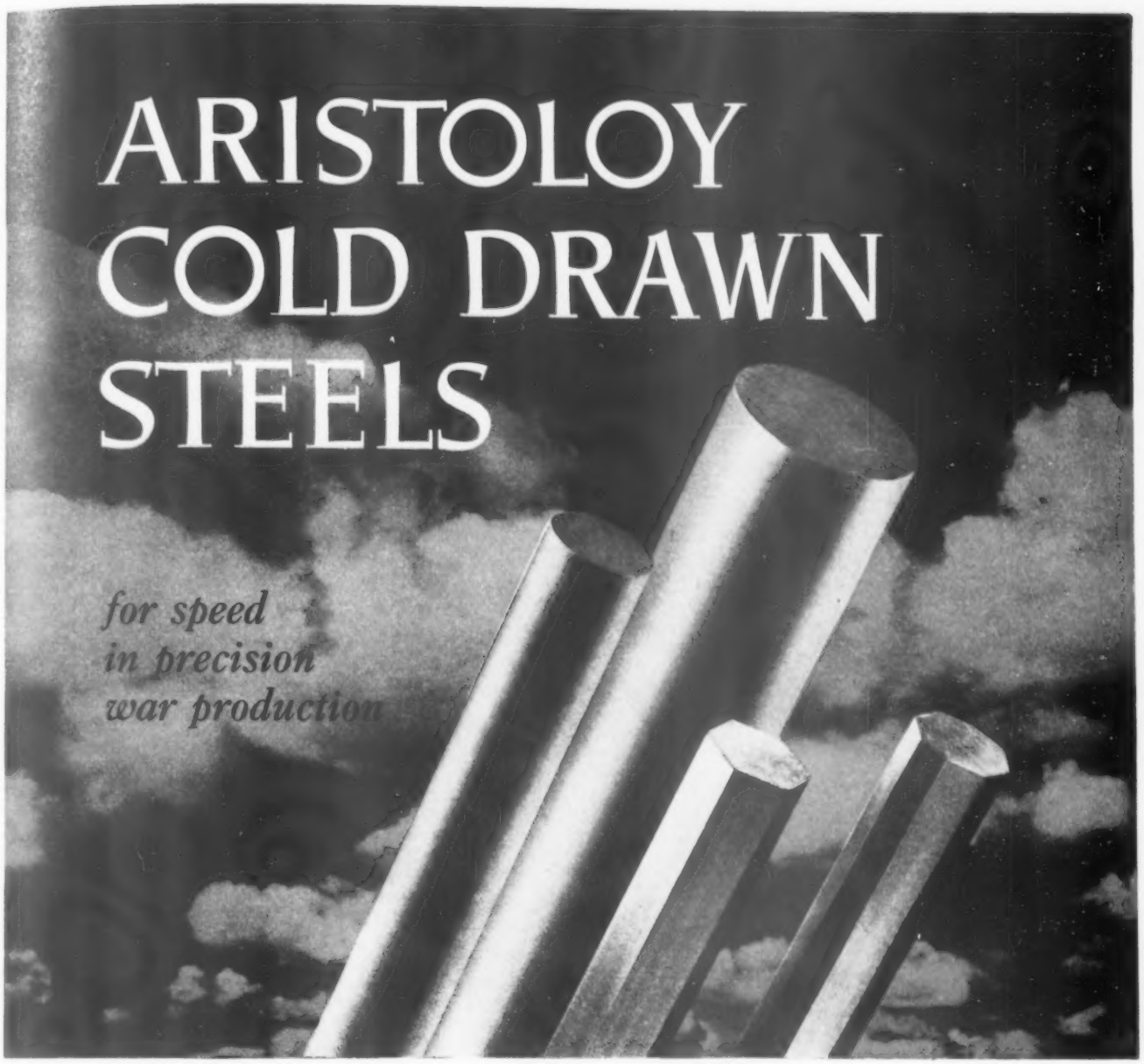
Someone has said that the *lights* of civilization are all going out, and so it would seem.

There is, however, one *light* that burns with ever increasing radiance and that one *light* is destined to light anew all the rest.

This month we are again reminded of that *light* and the soul uplifting hand for which it stands. And it is with that thought and in that spirit that The Sidney Machine Tool Company would with you observe Christmas.

THE
SIDNEY MACHINE TOOL COMPANY
SIDNEY, OHIO

ARISTOLOY COLD DRAWN STEELS



Cold Drawn Steels have the vital wartime job of keeping fast automatic production machines operating continuously at peak loads. The uniform surface and close tolerance of Aristoloy Cold Drawn Steels assure smooth machining with longer tool life and uninterrupted production.

COPPERWELD STEEL COMPANY
WARREN, OHIO

ARISTOLOY STEELS

TO BUILD MORE • • • BETTER • • • FASTER

Carbon Tool Steels • Aircraft Quality Steels • Nitralloy Steels • Alloy Tool Steels • Stainless Steels • Bearing Quality Steels • Cold Drawn Steels

"What— no extra Calipers?"

Yes, plenty of extra pairs . . . thanks to a Distributor's salesman who knew where to look

He was new in the place—his first job was checking odd lots of shafting. All ready, except for calipers—not a pair to be found.

"Hey, loan me your calipers" he yelled across to the next man—"what kind of a place *is* this that doesn't have scads of 'em in easy reach?"

But that man's calipers couldn't be spared. In fact, it finally developed that no dealer in the city had any in stock. But as usual—

The representative of an Industrial Supply Company happened to know where he could pick up a box of brand-new ones that the owner didn't need and was willing to sell. Everybody happy!

This incident is typical of the unusual services that many Mill Supply Distributors are rendering their customers during the Emergency.

The Representatives of *your* nearby Industrial Supply Houses not only can do a "Sherlock Holmes" helping you unearth scarce materials now and then, but can lend your short-handed Purchasing Department valuable help in other ways besides.

You can call in their help with full confidence—because they are our own Industrial Distributors, selling Cle-Forge High-Speed Drills and Peerless High-Speed Reamers throughout America during many years.

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49th STREET
CLEVELAND

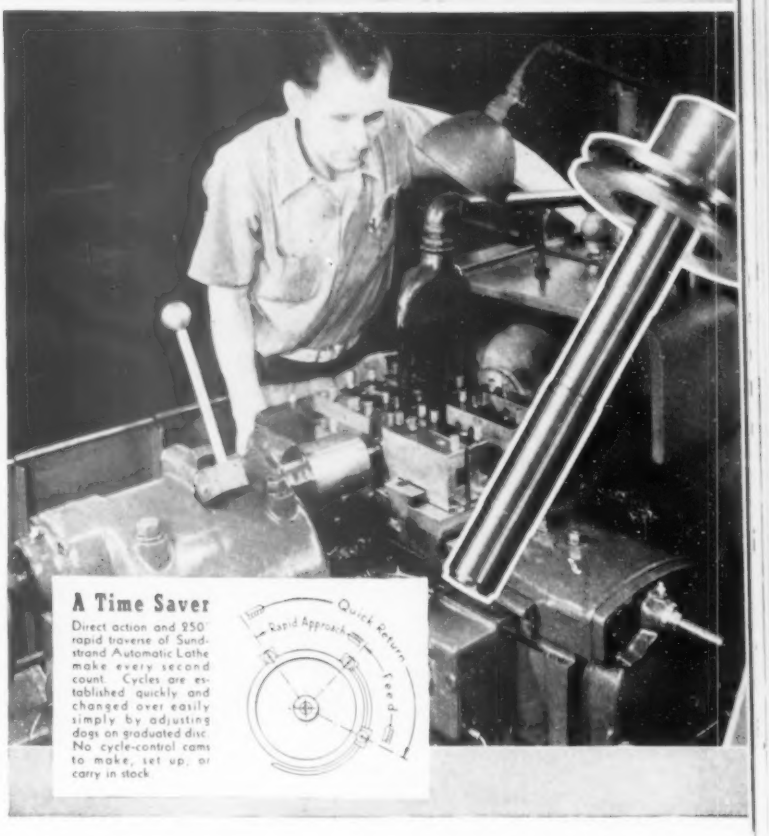
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

30 READE ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 650 HOWARD ST. SAN FRANCISCO
6515 SECOND BLVD. DETROIT · LONDON - E. P. BARRUS, LTD. - 35-36-37 UPPER THAMES ST., E.C.4

"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

Engineered Production

Turning Time Cut From 13 to 3 Minutes On Aircraft Engine Parts


A Time Saver
Direct action and 250° rapid traverse of Sundstrand Automatic Lathe make every second count. Cycles are established quickly and changed over easily simply by adjusting dogs on graduated disc. No cycle-control cams to make, set up, or carry in stock.
Quick Return
Rapid Approach
Feed

Turning tailshafts for aircraft engines, engineered production on Sundstrand Automatic Lathe shown at right reduced turning time from 13 minutes to 3 minutes for one operation; and makes similar time savings in two additional turning operations on these parts.

High Production — Exclusive Sundstrand advantages promote high production, with closely controlled accuracy; on turning these tailshafts in several sizes each requiring different set-ups.

Quick Set-Up — The operating cycles of Sundstrand Automatic Lathes are established quickly and easily by simple adjustment. Correct speeds and feeds are secured readily through pick-off gears. Sundstrand standard tool blocks and bases also facilitate rapid set-up and change-over from one job to another.

Fast, Easy Operation — It is easy to get operators for Sundstrand Automatic Lathes. No previous experience or special training is necessary. Operators merely change work-pieces and start automatic cycles, the machines do the hard work. An operator can usually run two or more Sundstrand Automatic Lathes easily.

Other Work — Parts for a great many other urgently needed products, besides aircraft engines, are being turned most effectively on Sundstrand Automatic Lathes. Operation data sheets supplied promptly on request.

Engineered Production — Sundstrand Engineered Production Service is at your disposal for quick action in solving turning production problems. Use this service freely, especially on urgent war jobs. Be sure to send complete accurate information, with each inquiry.

For You ➡

This booklet describes Sundstrand adjustable cycle control, shown in panel above, and many other Automatic Lathe advantages. A copy will be mailed to you promptly on request. Write for it, today. Ask for Bulletin 807.

★ ★

The Army-Navy "E" flag flies above the Sundstrand plant. Every member of our organization is proud of his part in earning this award. We are firmly resolved to scale new heights of production achievement, to maintain steadily our high standards of accuracy, and to cooperate closely with every effort directed towards victory for the United Nations.

SUNDSTRAND MACHINE TOOL CO.

2532 ELEVENTH STREET, ROCKFORD, ILLINOIS, U. S. A.

Six keyways are broached in naval ring component on the Standard AMERICAN H-15-60 broaching machine shown at the right. The six equally spaced keyways are 1″ wide, ¼″ deep and tolerance of .001 is maintained.

After one keyway is broached the part is indexed and the broach manually returned to starting position. The next keyway is then broached. This process is repeated until all keyways are completed. Only a special fixture was necessary to adapt a standard machine to this operation.

AMERICAN BROACH & MACHINE COMPANY
ANN ARBOR, MICHIGAN, U. S. A.
BROACHING MACHINES, PRESSES, BROACHING TOOLS, SPECIAL MACHINERY

Division of SUNDSTRAND MACHINE TOOL CO. ROCKFORD ILLINOIS U.S.A.

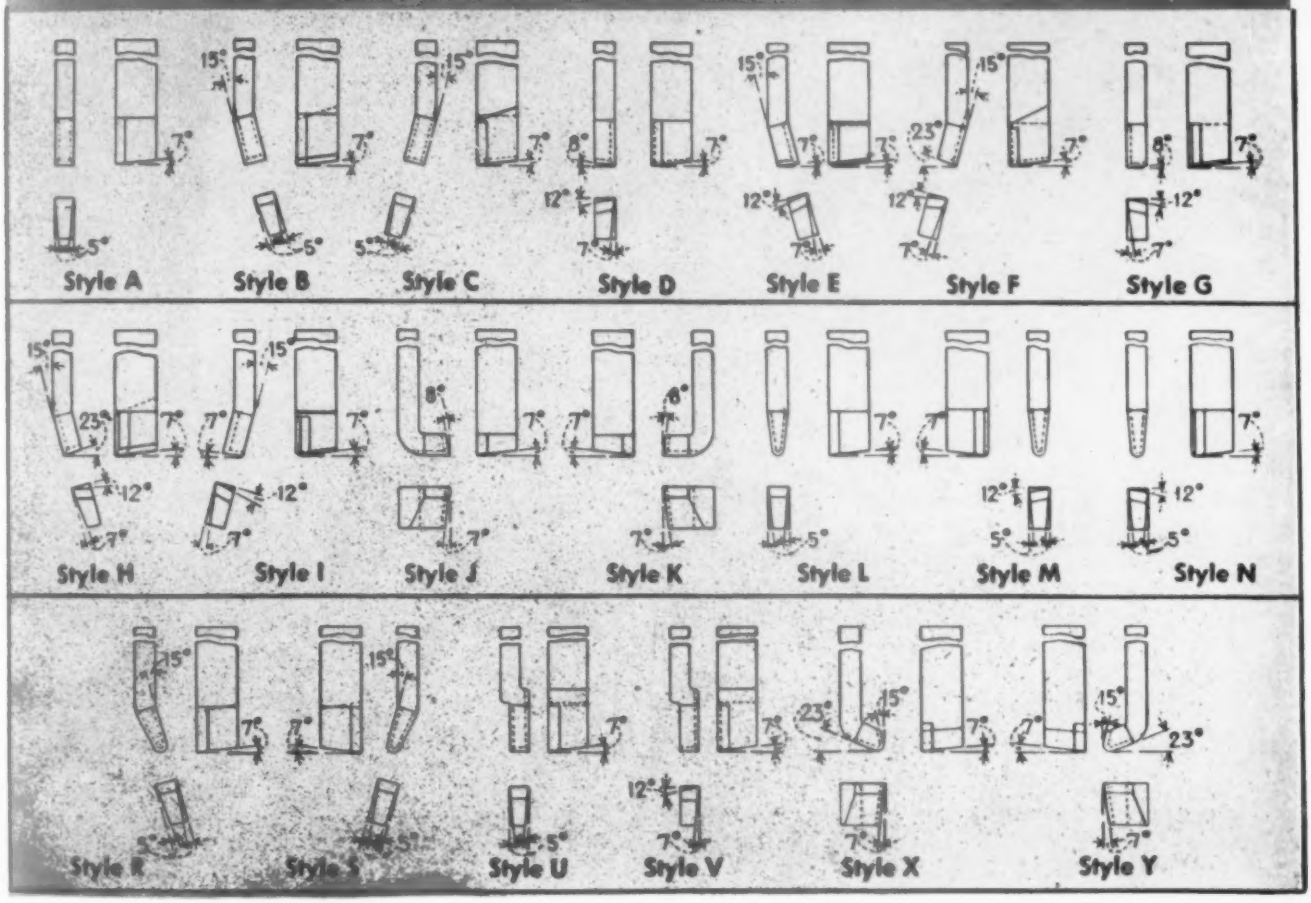
Immediate Deliveries . . . Lower Tool Costs
Use HAYNES STELLITE Standard Welded Tip Tools

YOU can take full advantage of the high production properties of Haynes Stellite cutting tools by using the many available styles and sizes of standard welded tip tools. These tools consist of a cutting tip of cast Haynes Stellite alloy welded to a tough steel shank. They can be used where solid bits are impracticable . . . and can perform any standard turning, facing or boring operation at low cost per piece machined . . . The sizes and styles shown in the table are carried in stock for immediate delivery. Others can be made to order to users' specifications.

SIZES OF HAYNES STELLITE STANDARD WELDED TIP TOOLS

Tool Sizes, inches	*Tool Styles*
½ x 1 x 7	A B C D E F
⅝ x 1 x 7	A D
⅝ x 1¼ x 8	A B C D E F G I K L M R S U V X Y
¾ x 1½ x 9	A B C D E F G L M U V
⅞ x 1¾ x 9	A
1 x 1 x 7	A D G N
1 x 1¼ x 7	A B D G J K L M N R S X Y
1 x 1½ x 10	A D U V
1 x 2 x 12	A D G
1¼ x 1¼ x 7	A D G J K L M N R S X Y

STYLES OF HAYNES STELLITE STANDARD WELDED TIP TOOLS



SOLID square and flat Haynes Stellite tool bits, and solid milling cutter blades are available for immediate delivery in a wide range of standard sizes. You can also obtain many special tools, such as brazed-in blade milling cutters, spot facers, and core drills; blades for boring and reaming; grooving, cutting-off, and forming tools. Complete information on request.

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

New York, N. Y. Kokomo, Indiana

District Offices: Chicago, Cleveland, Detroit, Houston, Los Angeles, New York, San Francisco, Tulsa

HAYNES STELLITE

"Haynes Stellite" is a registered trade-mark of Haynes Stellite Company.

5-SPINDLE HEAD *Multiplies* SHELL OUTPUT

★ This new multiple spindle head designed and built by Kent-Owens mills all five staking notches in a typical shell at the same time. This method greatly multiplies production over the former method of milling one notch at a time. Both actual machining time and handling time are reduced to a fraction of that formerly required.

The fixture shown is designed so that shells are rolled on to it from an adjoining conveyor, completely notched, and then rolled back onto the conveyor. This unit can be adapted for use on either a Kent-Owens No. 1-8 Machine with hydraulic feed to the table, or the No. 1-M with hand feed.

Write for details.

KENT-OWENS MACHINE CO., TOLEDO, O.

THERE'S A KENT-OWENS REPRESENTATIVE NEAR YOU

BOSTON
General Machinery Corporation

BUFFALO
Don W. Patterson

CHICAGO
Neff, Kohlbusch & Bissell

DALLAS
Hamilton-Huster Machinery Co.

DAYTON
Gosiger Machinery Company

DETROIT
A. C. Haberkorn Machinery Co.

GRAND RAPIDS
Joseph Monahan

HOUSTON
Oliver H. Van Horn Co., Inc.

INDIANAPOLIS
Oatis-Booth Machinery Co.

KANSAS CITY
Eichman Machinery Co.

LOS ANGELES
Eccles & Davies Machinery Co.
Harron, Rickard, & McCone

MILWAUKEE
Neff, Kohlbusch & Bissell

MOLINE
John J. Normoyle Company

MONTREAL
F. F. Barber Machinery Co.

NEW ORLEANS
Oliver H. Van Horn Co., Inc.

NEW YORK
Wilson Brown Company

PHILADELPHIA
Calco Machinery Company

PITTSBURGH
Barney Machinery Company

ROCHESTER
F. W. Schiefer Machinery Co.

SAN FRANCISCO
C. F. Bulotti Machinery Co.

SEATTLE
Star Machinery Company

ST. LOUIS
Blackman & Nuetzel Machinery Co.
Clarke Equipment Company

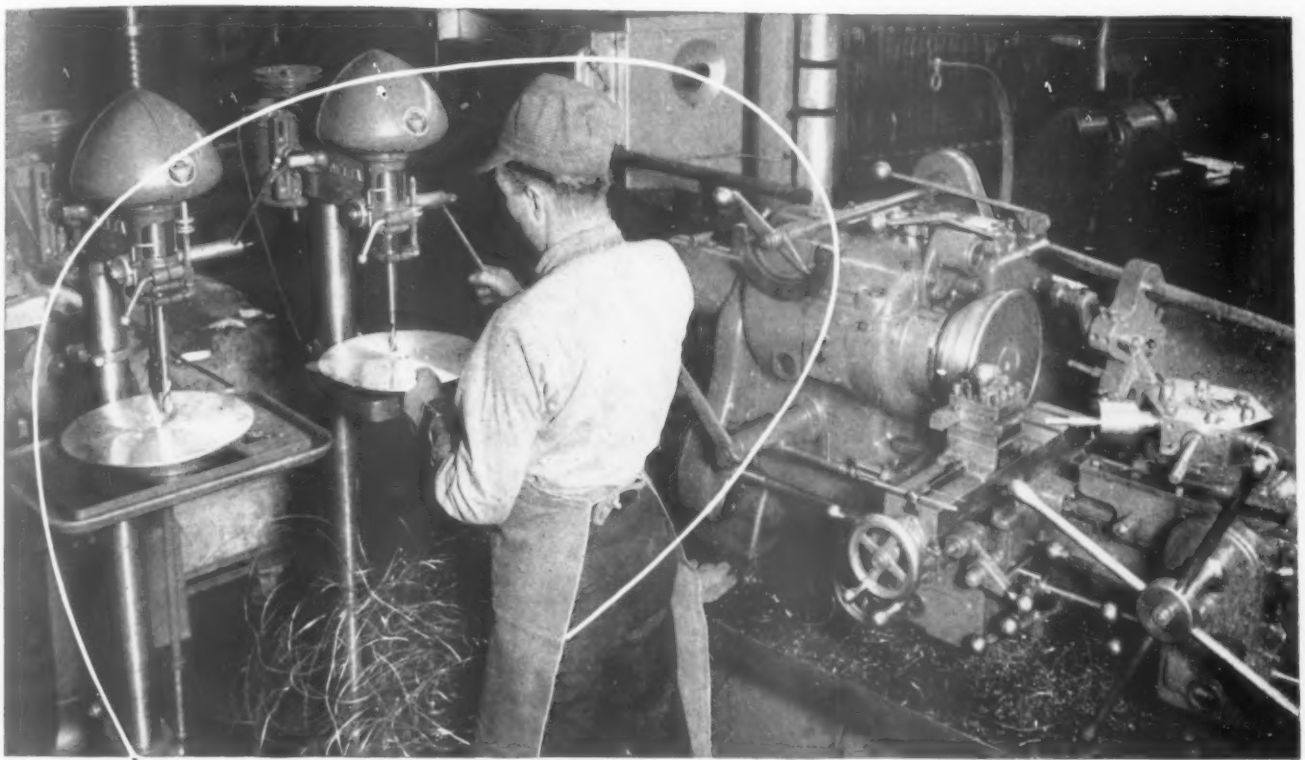
SYRACUSE
J. F. Owens Machinery Company

TORONTO
F. F. Barber Machinery Company

WALKERVILLE
F. F. Barber Machinery Company

Call on KENT-OWENS *for Milling Machines*

where you want them
when you want them



The *portability* and *flexibility* of Delta machines open many roads to increased production: Here illustrated are two 14-inch Delta Drill Presses set up alongside a screw machine. Operator performs two hand-feed operations on drill presses while waiting for power-feed on screw machine.

Other examples: When five drilling and tapping operations are required, a single spindle Delta Drill Press is moved up alongside a four-spindle drill press . . . to save toolmaker's walking and waiting time, individual Delta Drill Presses, Grinders and Band Saws are set up alongside each toolmaker's bench . . . when jobs are too big and bulky to move, Delta machines are adapted so they can be brought to the operation. (Full details will be furnished on request illustrating these and many other cases where Delta portability and flexibility have been utilized to solve production problems.)

DELTA DESIGN ALWAYS OFFERS THESE ADVANTAGES

- Low First Cost
- Low Maintenance Cost
- Economical Operation
- Reduced Labor Costs
- Greater Flexibility
- Portability

DELTA
MILWAUKEE

Send for FREE "Tooling Tips"

Write for this practical shop bulletin showing how other manufacturers are taking advantage of the many features of DELTA-Milwaukee machines. Also for latest complete catalog. Get in touch with your Delta Industrial Distributor or write to The Delta Manufacturing Company, 610-N E. Vienna Ave., Milwaukee, Wis.

Add This ONE WORD to Your Order

6 doz.	HACK SAW BLADES Made of Ingersoll D-B-L STEEL

When You Do So—You Get This Extra Advantage at No Extra Cost

"A Borg-Warner Product"

INGERSOLL D-B-L

(Tungsten . . . . . 5.00-6.00)
(Molybdenum . . 4.00-5.00)

The remarkable performance of Ingersoll D-B-L . . . its relative freedom from decarburization . . . its tough cutting quality and its high impact resistance . . . plus its lower cost, have made it a wartime favorite.

Only INGERSOLL has had 4 YEARS EXPERIENCE

in producing this Lower Cost Type of High Speed Steel for Hack Saw Blades

Specify *Ingersoll* D-B-L, on its 4-year record of past performance.

INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION
New Castle, Indiana
Plants: New Castle, Ind.; Chicago, Ill.; Kalamazoo, Mich.

INGERSOLL SPECIAL STEELS FOR SPECIAL USES

Alloy Steels
Armor Plate
Clutch Plate Steels
Tillage Steels
Soft Center Steels
Shovel Steels
Knife Steels
TEM-CROSS Steel
IngAclad (Stainless-Clad Steel)
Stainless Steels and Saw Steels, including "18-4-1" and Molybdenum and D-B-L Hack Saw Steels

Save Valuable Tool, Gage and Die Making Time

by using

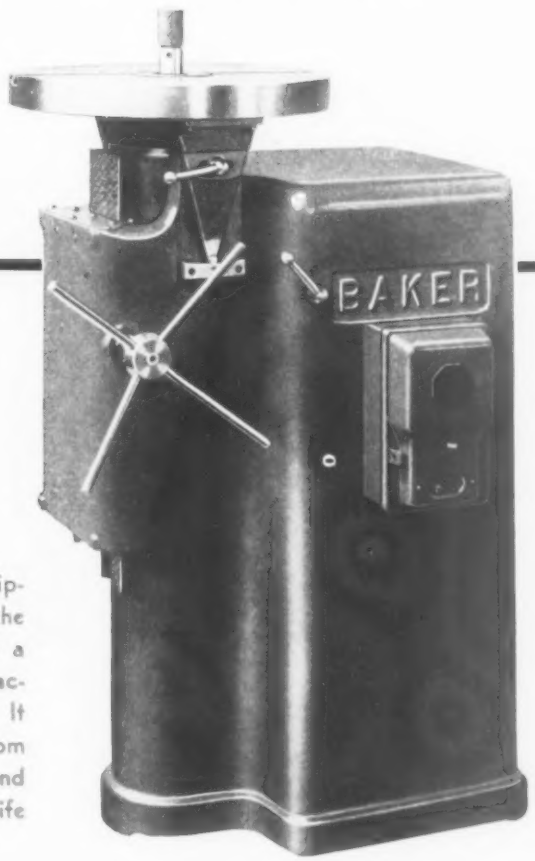
BAKER

Contour Grinders

One size only

Model

No. 3



The up and down reciprocating action of the spindle assembly gives a much better grinding action from the wheel. It prevents shoulder from forming on the wheel and also gives much longer life to the wheel.

This BAKER No. 3 Contour Grinding Machine has been designed for rapid, economical, and accurate grinding and polishing of contours or irregular shapes. It is a highly practical machine for a class of work that has not been adequately met before.

The table is 18 inches in diameter and well ribbed, allowing for close alignment between the table and spindle. It has a T-slot to the front and rear, which is used for applying the diamond dresser and for mounting other attachments to the table.

Write for our New Circular, just off the press

BAKER BROTHERS, INC. TOLEDO, OHIO

Also Manufacturers of

DRILLING • BORING • TAPPING MACHINES

BAKER

For boring of steels . . . use KENNAMETAL* single point tools

Tom the foreman says:

KENNAMETAL* Eliminates Multiple-Blade Cutters

"We have found in our shop that since the advent of KENNAMETAL, multiple-blade cutters are no longer necessary to bore steel and we feel it our duty to pass along this production discovery to all plants which are boring steels on war jobs.

"Many shops are still using the antiquated multiple-blade type cutter inherited from the days of tungsten steel boring tools.

"When carbide cutting tips came into existence, shops eliminated the old boring tool design. They failed to realize that a KENNAMETAL tip need not share the cutting load with a number of other blades.

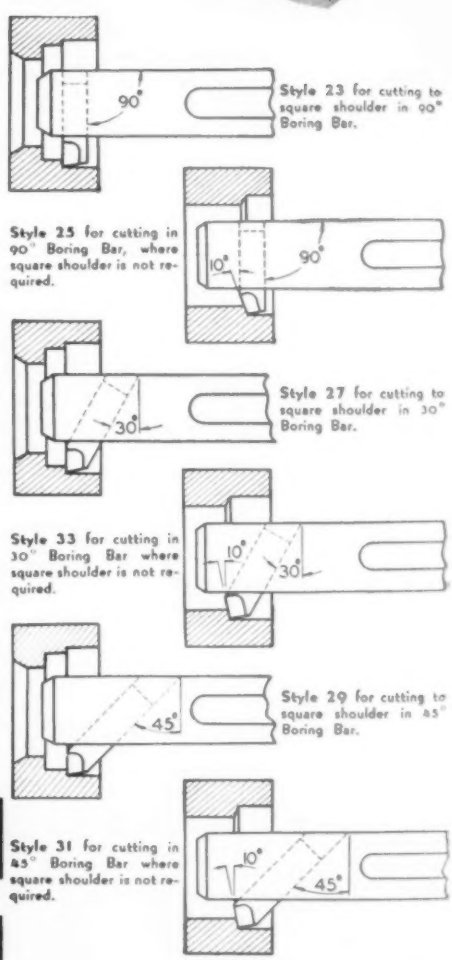
"When a single-point KENNAMETAL boring tool is used on our ordinary boring bar it holds a truer bore than two or four blade tools do. It can be run six times faster and ¼ the feed per revolution as is necessary with a two blade high speed steel cutter. This gives only half the force tending to deflect the boring bar. Furthermore, this single point KENNAMETAL boring tool can be ground off-hand, whereas a multiple-blade cutter must be ground on a cutter grinder and costs less than one-tenth as much as the two-blade type.

"In addition, the single-point boring tool with a small nose radius reduces chatter caused by tool pressure and can be positioned more easily than the multiple blade type tool.

"The operation diagrams at the right show standard boring applications of KENNAMETAL tools which can be ordered direct from the McKenna Metals Company catalog, at a small fraction of the cost of a multiple blade cutter despite the fact that the single-pointed tool can turn out more work."

Write for your copy of the new Catalog No. 43.

*INVENTED AND MANUFACTURED IN U. S. A.


90°
Style 23 for cutting to square shoulder in 90° Boring Bar.
Style 25 for cutting in 90° Boring Bar, where square shoulder is not required.
10°
90°
30°
Style 27 for cutting to square shoulder in 30° Boring Bar.
Style 33 for cutting in 30° Boring Bar where square shoulder is not required.
10°
30°
45°
Style 29 for cutting to square shoulder in 45° Boring Bar.
Style 31 for cutting in 45° Boring Bar where square shoulder is not required.
10°
45°

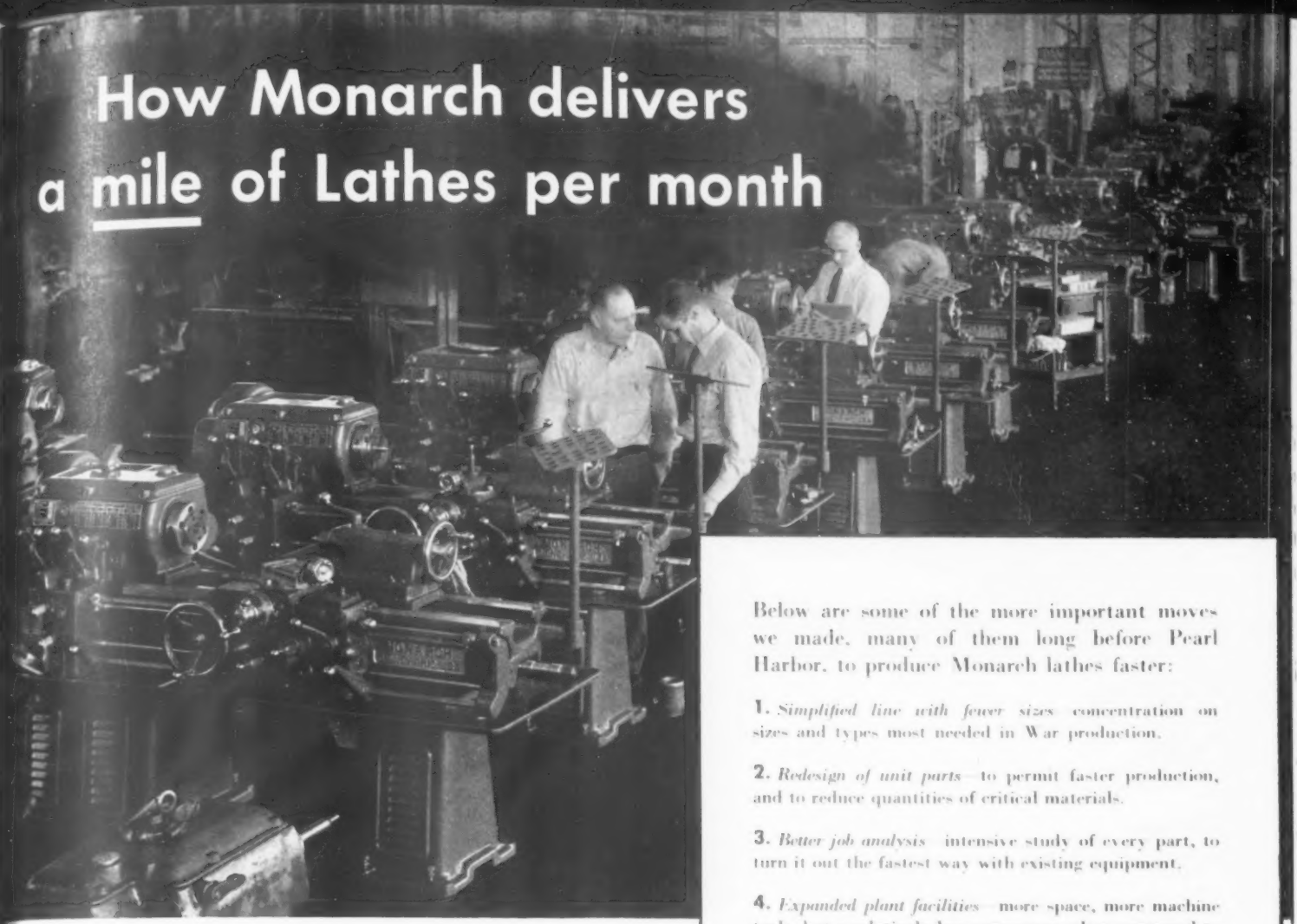
McKENNA METALS Co.

600 LLOYD AVE., LATROBE, PENNA.

Trade Mark Reg. U. S. Pat. Off.

Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York (Exclusive of Canada and Great Britain)

How Monarch delivers a mile of Lathes per month



The exact number is a military secret. But if you use the old method of placing them "end to end," they'll stretch out a mile, almost any month. And they're all going into the fight for Victory.

Our production in 1942 is double that of 1941, four times that of 1940. Several reasons account for this, which are listed briefly at the right.

If you can use our experience to increase your production, we are anxious to share it. We have no secrets about *anything* that will help bring Victory faster.

MONARCH LATHES

COVER THE TURNING FIELD

Below are some of the more important moves we made, many of them long before Pearl Harbor, to produce Monarch lathes faster:

1. *Simplified line with fewer sizes*—concentration on sizes and types most needed in War production.

2. *Redesign of unit parts*—to permit faster production, and to reduce quantities of critical materials.

3. *Better job analysis*—intensive study of every part, to turn it out the fastest way with existing equipment.

4. *Expanded plant facilities*—more space, more machine tools, but a relatively low percentage when compared to our rate of production increase.

5. *Better tooling*—to fit the job, and with almost 100% use of tungsten carbide tools.

6. *Better plant layout*—to avoid back tracking, useless handling of materials and processed parts.

7. *Reduced "waiting time"* for materials by careful scheduling, which also reduces inventories on critical materials.

8. *Supervisor training*—continuous classes to develop competent supervisors needed to guide heavy influx of new workers.

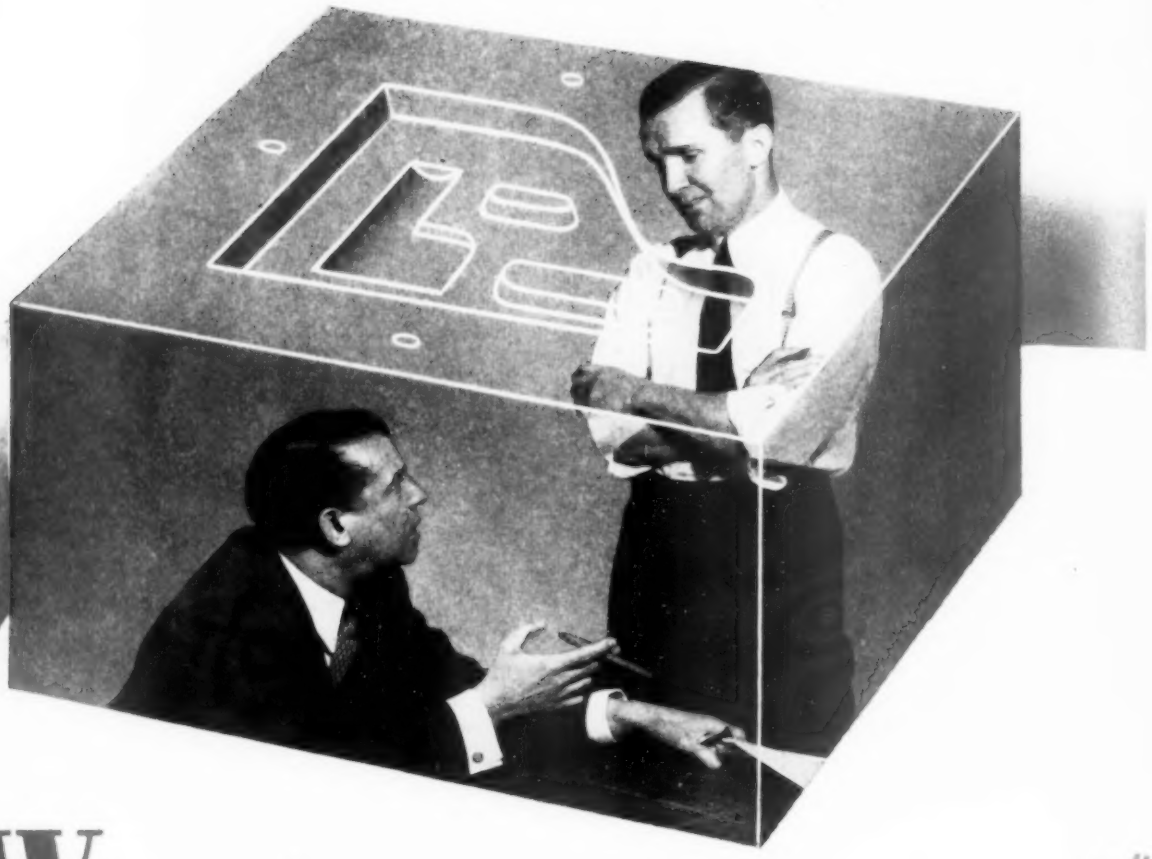
9. *Vestibule school* for every new man and woman employed, in which they are observed, trained and then placed where they will be most useful.

10. *Three balanced shifts*—with 7-day operation to get the most production out of every machine in our plant.

11. *Loyalty and patriotism* of every employe, who knows the lathes they build turn out implements and munitions for Victory. They know this is *their* fight, too, and *they're doing the job.*

Realizing the value of *time*, we have sacrificed everything to it, except one basic principle. There shall be no let-down in the quality and accuracy of Monarch lathes, for this means only ultimate *waste* instead of *saving.*

THE MONARCH MACHINE TOOL COMPANY • • • SIDNEY • OHIO



"We need more production... per die"

... and LATROBE helped increase output as much as 300%

A large user of die steels, had been using a steel of a particular analysis which for years had given good performance. Yet production had to be increased!

Latrobe's trained metallurgical staff was called upon to provide a solution. Many factors had to be considered, such as toughness, deformation in heat treatment, ductility possible with high hardness, etc. The answer required diligent application, exhaustive study, patient research.

But the result proved the worth of *Latrobe Metallurgical Service*, for production per die was increased *as much as 300%*.

This is a war of METALS

It calls for conservation and replacement of critical metals. It presents new problems in selection, application and handling of tool steels. You'll find Latrobe Metallurgical Service a vital wartime aid in such cases ... we'll gladly help you without obligation!

LATROBE

Metallurgical Service

Latrobe ELECTRIC STEEL COMPANY

LESCO

MAIN OFFICES *and* PLANT • LATROBE · PENNSYLVANIA

Number 22

NOW... A NEW STAR for every Cutter and Tool Grinding Performance

New member of a long line of Covel Grinders, this No. 22 Universal Cutter and Tool Grinder moves into the spotlight for your inspection and approval.

FAST, ACCURATE and FLEXIBLE for TODAY'S TOOLS and TOMORROW'S

So that you may have complete details and pictorial description of this greatest of Covel Cutter and Tool Grinders, an attractive booklet portraying the advantages of this truly universal machine is now ready for release. And when you see for yourself the scores of No. 22 advantages and advancements, you'll agree that here is the Cutter and Tool Grinder of tomorrow—ready TODAY.

Write, wire or phone Now for your copy of Bulletin TE112 and name of dealer nearest you.

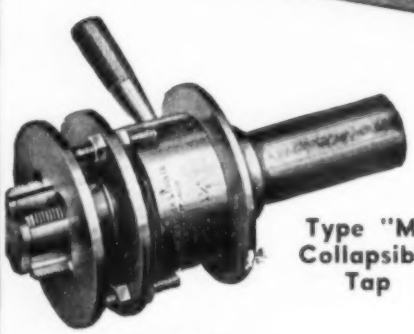
Early deliveries to Essential War Industries.

Grinding Machinery Since 1874

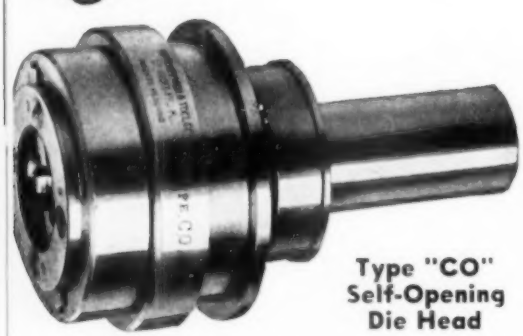
COVEL INDUSTRIAL GRINDERS

COVEL MFG. CO., BENTON HARBOR, MICH.

There's A Murchey for MOST Threading Jobs!



Type "M" Collapsible Tap



Type "CO" Self-Opening Die Head

WHETHER it's a question of size, tolerance or production, Murchey threading equipment covers a wide range in cutting external or internal threads.

The new No. 42 Murchey Thread Milling Machine extends the range into the zone of larger diameter threads from 4" to 12", external or internal, right or left hand, where extra accuracy is needed.

The use of full-length annular milling cutters, and accurate control of pitch and depth produces precision-cut threads at a production rate which will interest you.

Murchey also manufactures all types of Collapsible Taps, Self-Opening Die Heads and Shell Tapping Machines

MURCHEY MACHINE & TOOL COMPANY

DETROIT, MICHIGAN

You can make HEAVY FORMING CUTS on
OSTER
No. 601 "RAPIDUCTION" SIMPLIFIED TURRET LATHES
An unretouched photograph of an Oster No. 601 machine making a heavy forming cut. Note absence of chatter as demonstrated by the clean cut appearance of the stock.

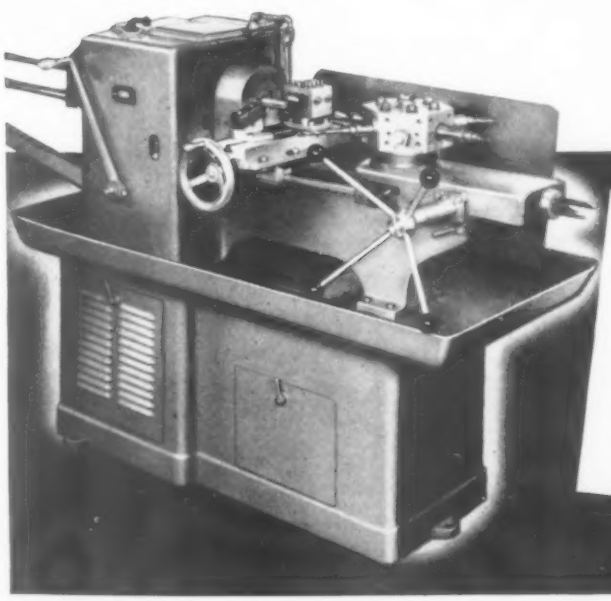
It takes a smooth, even flow of power (and plenty of it!) to make heavy forming cuts with absence of chatter, as illustrated in the above view. Batteries of Oster No. 601 machines are doing it on 'round-the-clock production schedules!

Equipped with *worm drive*, the smooth power of the No. 601 machine is obtained with the hardened and ground steel worm, which, like the spindle, is mounted in ball bearings.

(Where high speed work is required on small diameters and non-ferrous metals, the No. 601 is equipped with *direct drive* from motor to spindle. Spindle speeds up to 3000 R. P. M. are obtainable.)

Low Cost! Prompt Delivery!

Exclusive of tooling, the Oster No. 601 costs less than $2000.00 F. O. B. factory. Orders placed *NOW* will be scheduled for delivery in less than 90 days from date of order.



For Quick Action—USE THIS FORM!

THE OSTER MFG. CO. • 2063 East 61st St., Cleveland, Ohio

Rush, by return mail ..... copies of Catalog No. 27-A which contains full description and detailed illustrations of No. 601 Turret Lathe.

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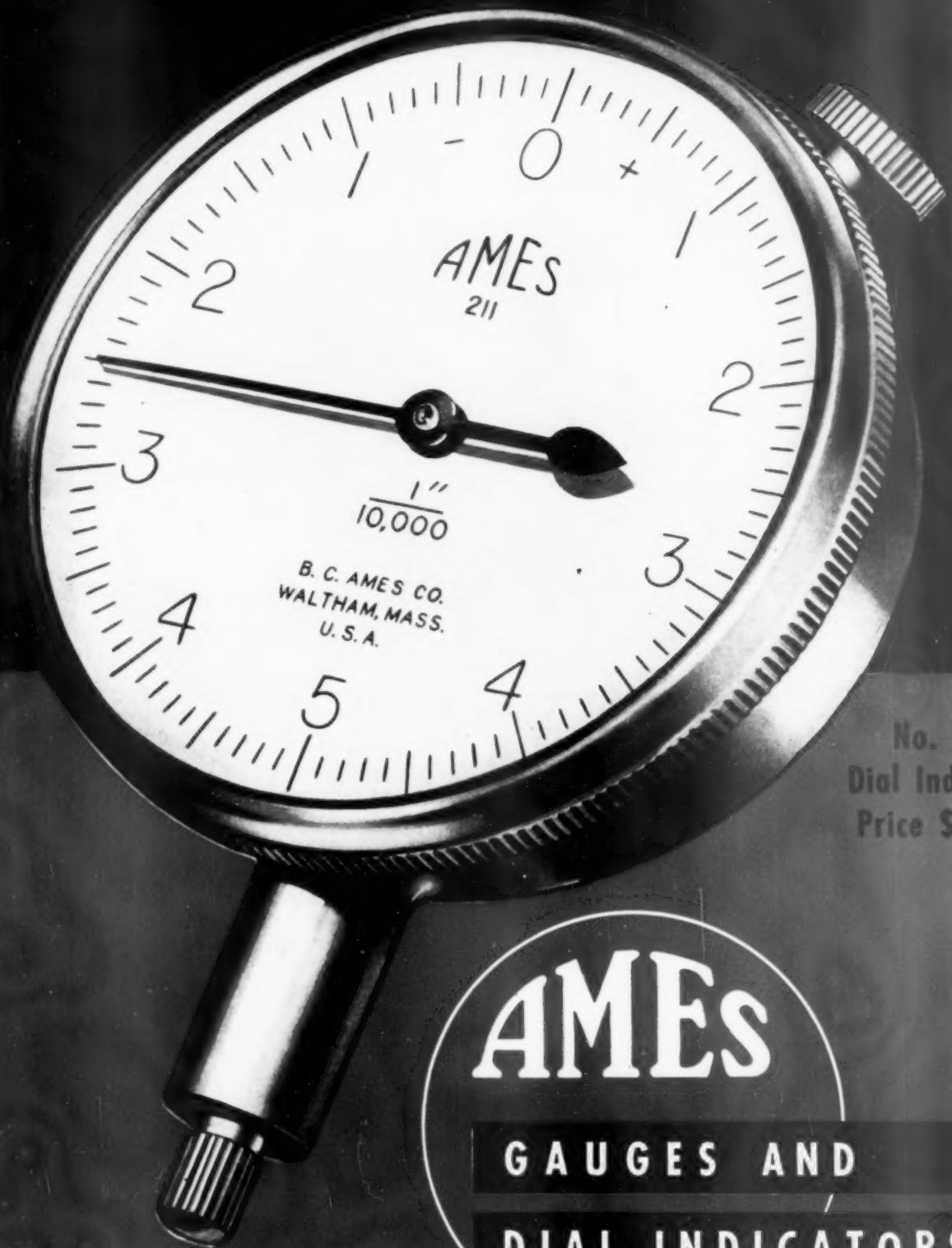
CITY ..... STATE .....

AMES and ACCURACY . . . HAND in HAND FOR 47 YEARS



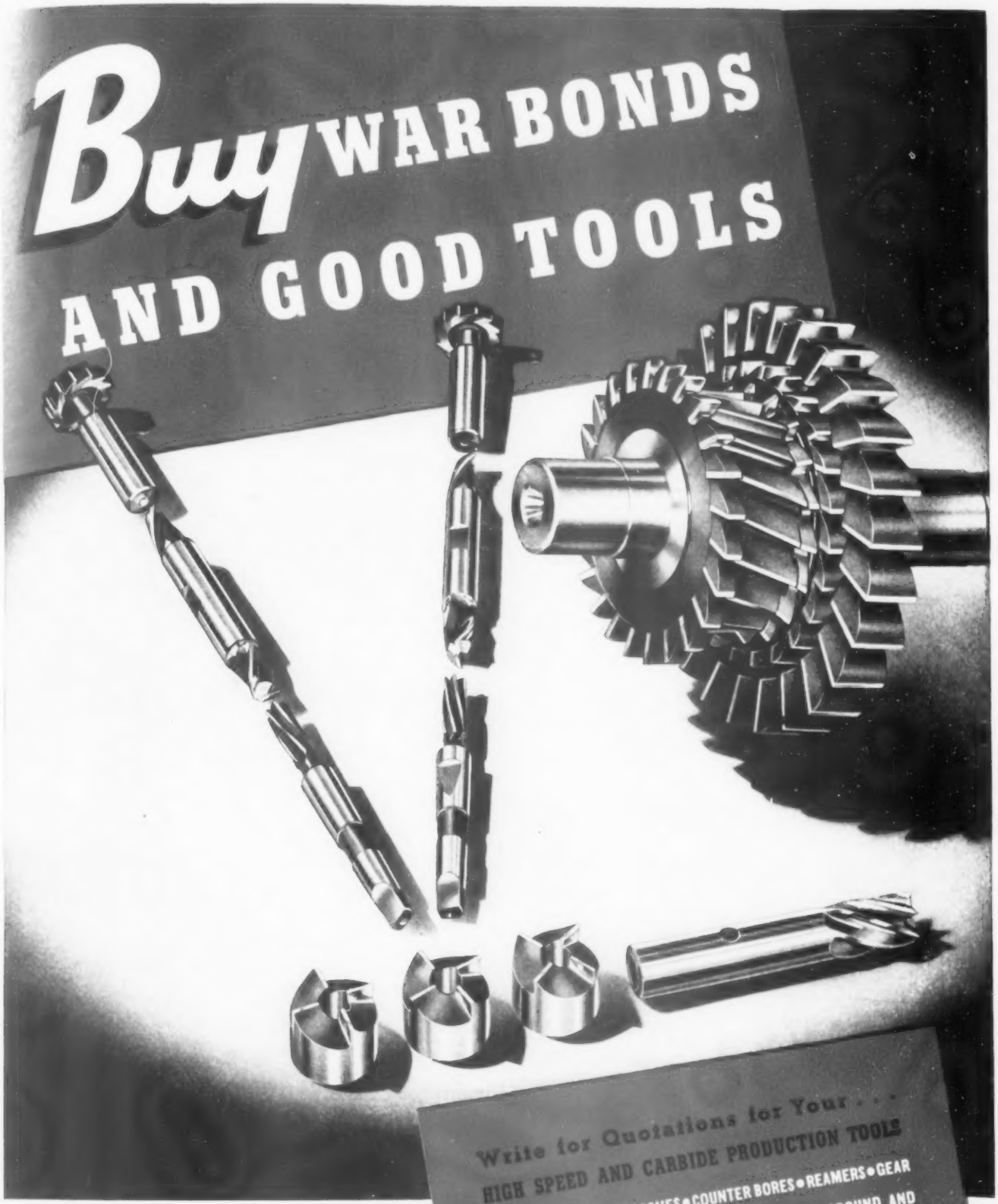
No. 211
Dial Indicator
Price $27.00

AMES

GAUGES AND DIAL INDICATORS

Write for Catalog No. 54 showing complete line of Dial Indicators, Micrometers, Gauges and Comparators.

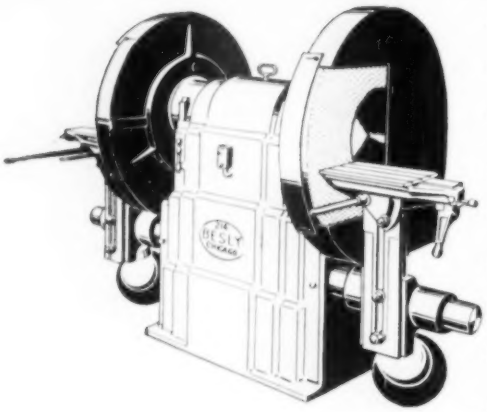
B. C. AMES CO., WALTHAM, MASS., U. S. A.


Buy WAR BONDS
AND GOOD TOOLS
Write for Quotations for Your . . .
HIGH SPEED AND CARBIDE PRODUCTION TOOLS
MILLING CUTTERS • BROACHES • COUNTER BORES • REAMERS • GEAR
CUTTERS • UNGROUND GEAR AND SPLINE HOBS • GROUND AND
UNGROUND MULTIPLE THREAD MILLING CUTTERS • GROUND FLAT,
DOVETAIL AND CIRCULAR FORM TOOLS AND SPECIAL CARBIDE TOOLS

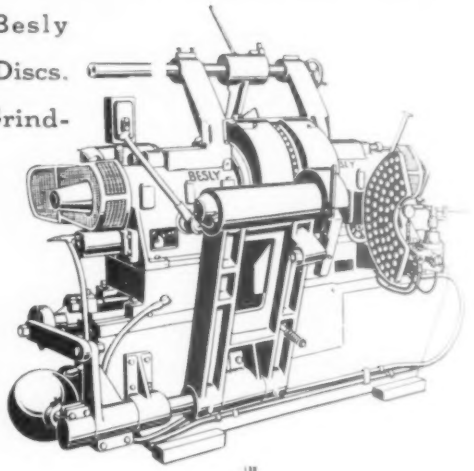
CARBIDE
TOOL COMPANY
OF CHICAGO

816 NORTH KOSTNER AVENUE, CHICAGO, ILLINOIS

DISC GRINDERS BECOME REAL PRODUCTION TOOLS



when equipped with Besly Titan Steelbac Abrasive Discs. This modern Bolted-On Grinding Member with 1″, 2″, or 3″ useable Abrasive is fast, cool cutting, safe, economical and easy to mount. In Stud Type and Nut Inserted. Always made of Resinoid Bond.



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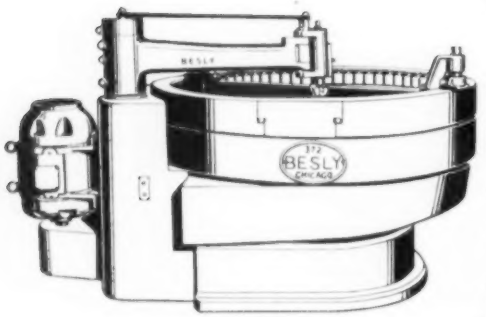
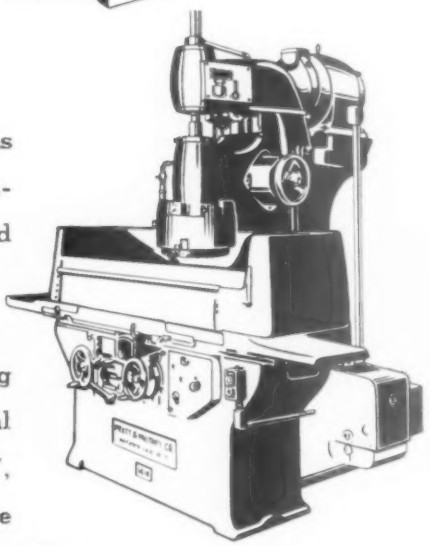


The Besly Titan Steelbac has been adopted by many prominent users of Blanchard and Pratt & Whitney Type Grinders. The Besly Titan Steelbac has eliminated the sulphuring operation and waste incidental to such procedure. You get 3″, 4″ or 5″ of useable Abrasive when you specify Besly Titan Steelbacs for your Blanchard or Pratt & Whitney Type Grinder.



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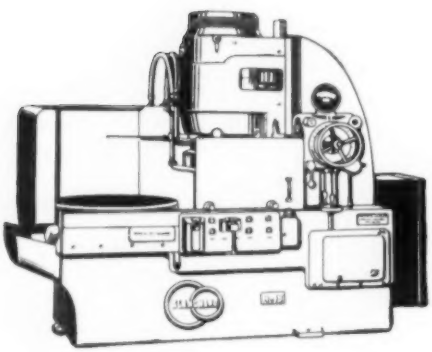
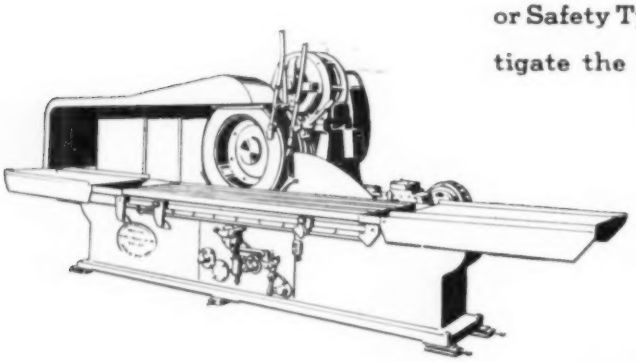


If you operate a Travelling Table Grinder of the Bridgeport, Diamond or Safety Type it will pay you to investigate the advantages of Besly Titan Steelbacs on that machine. Used in connection with such Grinders, they eliminate heavy Ring Wheel Chucks and wasteful stubs. Besly Titan Steelbac Abrasive Discs are furnished in various grains and grades, also proper density depending on the particular application.

Write for your copy of Booklet on Besly Titan Steelbacs



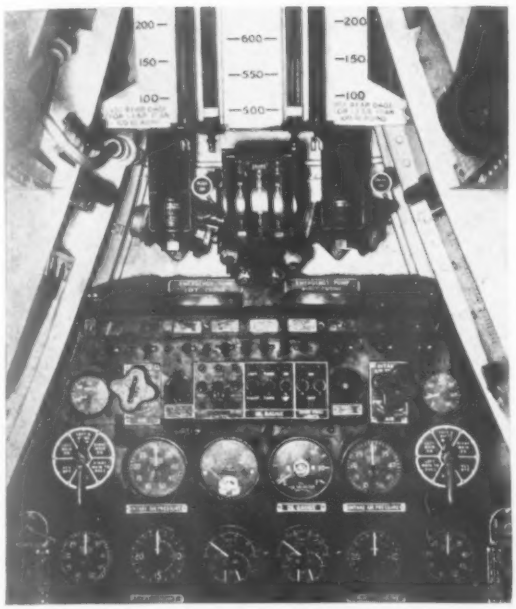
CHARLES H. BESLY & COMPANY

118-124 NORTH CLINTON STREET ★ CHICAGO, ILLINOIS

A Suggestion For Solving a War Production Problem

BARBER-COLMAN

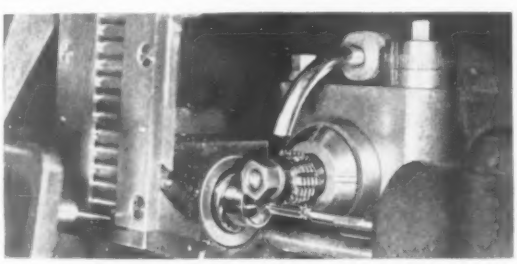
TYPE "S" HOBBING MACHINES FOR SMALL GEARS IN INSTRUMENTS



("OFFICIAL U. S. NAVY PHOTOGRAPH")

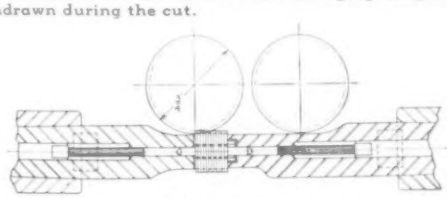
INSTRUMENT BOARD OF NAVY PLANE

These engine-performance instruments, watched by the mechanic in the tower of a patrol plane, are typical of thousands of indicating units which require small gears and pinions of high accuracy in great numbers.

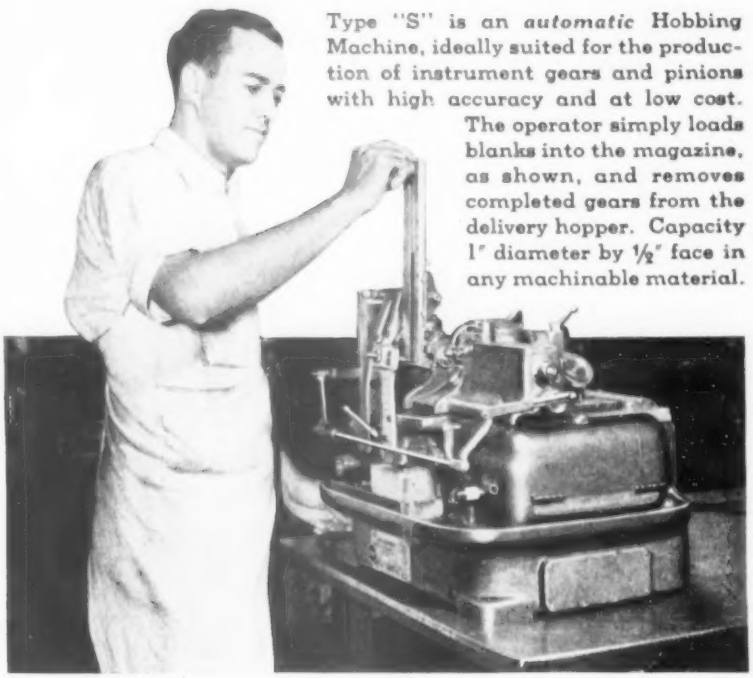


CLOSE-UP OF TYPE "S" OPERATION . .

Showing a 7-tooth, clock form, .0768" circular pitch pinion in process of being hobbed. Note the cut-away tail stock permitting clearance for the hob teeth on a gear of small diameter, also the swinging magazine withdrawn during the cut.



12 PCS. ON ARBOR



Type "S" is an *automatic* Hobbing Machine, ideally suited for the production of instrument gears and pinions with high accuracy and at low cost. The operator simply loads blanks into the magazine, as shown, and removes completed gears from the delivery hopper. Capacity 1" diameter by ½" face in any machinable material.

ACCURACY. Close tolerances are maintained on both tooth form and spacing, as a natural result of the hobbing process which is a continuous generating action.

Special precision tooling equipment is supplied to suit customers requirements. Users have reported run-out of less than .0002".

PRODUCTION. Actual rate of production depends, of course, on characteristics of the work such as accuracy and finish desired, size, number of teeth, etc. One job is being cut at the rate of 640 pieces per hour.

MECHANICAL CONTROL. All machine functions are automatic and under positive mechanical control. This includes moving the work to cutting position, rapid approach to hob, feed, quick return, ejection of work, and repeat.

A TYPICAL TYPE "S" SET-UP . . . .

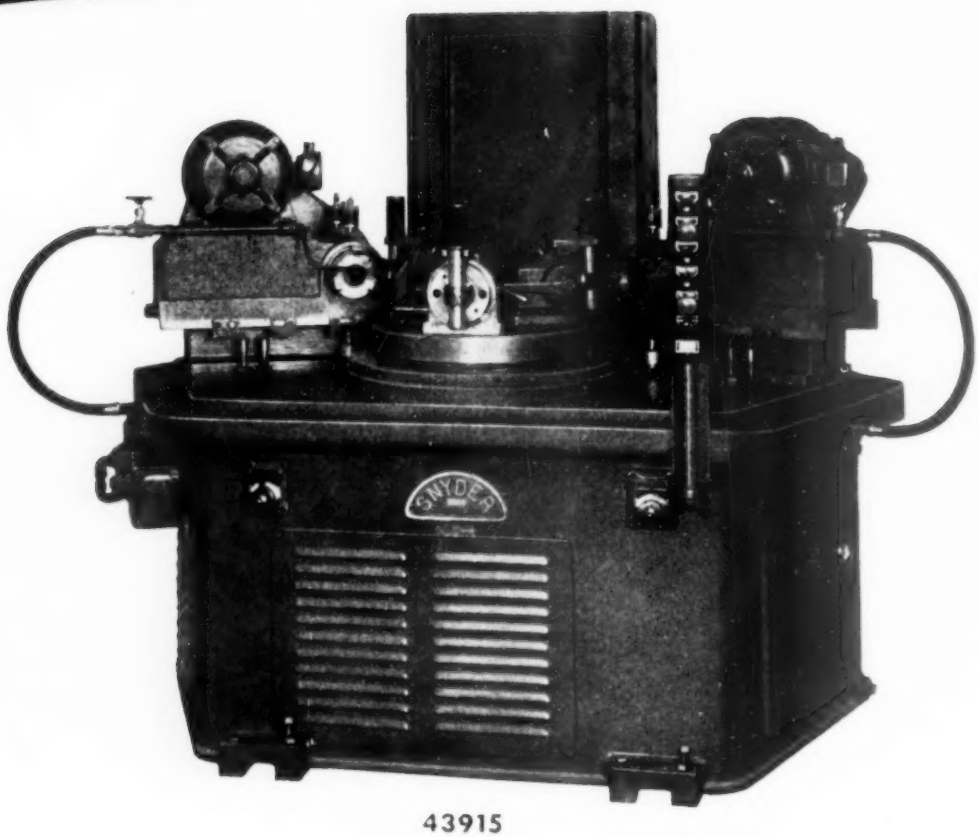
The drawing at the left shows how a load of 12 small, thin gears, pre-loaded on a special arbor, are held between the driving head stock and retractable tail stock. Circles indicate the start and finish position of the ¾" diameter hob.

BARBER B-C COLMAN PRODUCTS: HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

BARBER-COLMAN COMPANY

General Offices and Plant 213 Loomis Street, Rockford, Illinois, U. S. A.

2-Spindle, Hydraulic Valve Clearance Mill for Aircraft Pistons . . . Triples Production



43915

Tripled production and improved cutting technique are the accomplishments of this special machine, designed and built by Snyder for milling valve clearance pockets in aircraft engine pistons.

Two-way type sliding spindle housings are synchronized to a standard, electrically powered, Snyder 3-station Geneva index table. The piston is positioned manually with a pin engaging the wrist-pin holes of the piston and is clamped by means of simple cam action in the fixture.

The work cycle consists of an index, followed automatically by the infeed of the cutters into the work. While one piston is being loaded, the other two are receiving their successive cuts. The cycle is semi-automatic so that after manual clamping, an electric starter button must be pressed for each work cycle.

The use of the standard Snyder 3-station Geneva index table as the basis of the automatic cycle mechanism is typical of how Snyder standard assemblies are used to expedite the output of special machines to solve today's production problems.

If production is *your* problem, we invite your inquiries.

SNYDER
TOOL & ENGINEERING CO.
3000 E. Lafayette Ave. • Detroit

designers and builders of machinery for **HIGH** *production at* **LOW** *unit cost*

DoAll

THE TIME STRETCHER

Left—"Drill Jig for gun mounting cut in 1½ hours by the DoAll. Diameter 35", thickness 1¼". Due to accuracy required, the plate could not be torch cut. The only other way to do the job was to slit it on a miller or part it in a planer. Our DoAll solves problems such as this in one-quarter the time."

MAKES 4 MAN HOURS OUT OF 1

Below—"Special Jig Clamp used to hold a gun sight casting. A 3-dimensional cutting job 3¼" x 3¼" x 6". The usual way is to shape it, requiring at least eight hours. DoAll cuts it in 2 hours."

FOR BUSY PLANTS

The World's Greatest Machine Tool Value

- Slices contours through thick sections
- Fastest precision method of internal and external cutting of any metal or alloy
- Cuts so clean, further machining is unnecessary
- Relieves miller, shaper and lathe of hundreds of over-load jobs
- ★ Eliminates bottlenecks on regular production lines
- ★ Avoids shut downs of important machines by actually making new replacement parts
- ★ Makes special tools without dies or molds
- ★ Saves hundreds of man hours—tons of metal

WANT TO SEE IT WORK?

A factory trained man will call with a DoAll and show you how this wonder machine will aid in getting your jobs out ahead of schedule.

CONTINENTAL MACHINES, INC.

1304 S. Washington Ave., Minneapolis, Minn.

Associated with the DoAll Company, DesPlaines, Ill., Manufacturers of Band Saws and Band Files for DoAll Contour Machines.

Par. No. 2,255,577
Pat. No. 2,127,313
Other Pats. Pending

EASY READING

"DoAll on Production", an illustrated book you'll want to send for today.

THE EXACT SIZE FOR EVERY DEPARTMENT

1. Under $5000
2. Under $2500
3. Under $2000
4. Under $1500
5. Under $1000

All Models with Motors

MADISON-KIPP

FOR PRODUCTION WORK
FOR TOOL ROOMS

IT'S NEW

IT'S FAST

IT'S HANDY

IT'S POWERFUL

for High Priority Producers

TODAY'S BEST ALL AROUND OFF-HAND TOOL!

Madison-Kipp tool-makers originated the first really high speed grinder. They know a great deal about the practical side of grinder design and grinder usage. They think the new Model H is the best all around off-hand tool they have ever tried and we are sure you will agree with them. It's fast (50,000 R.P.M.), more powerful, and has a handier grip. If you are doing high priority work, order today!

$29.75

MADISON-KIPP CORPORATION

209 WAUBESA STREET, MADISON, WIS., U.S.A.

IT'S THE *Model*

H

KIPP *air* GRINDER

5-METHOD
COMPLETE TOOL SERVICE *for* MAXIMUM PRODUCTION

Typical Toolup with Milled and Brazed Tools

This installation is typical of the countless cases where Method Two — Milled and Brazed Tools — is used. This class of tools is meeting with great favor among users of carbide tools. You have your choice of a dozen general purpose and special purpose grades of Ramet Tantalum-tungsten carbide blanks, to be brazed to almost any shape of shank. Thus a wide variety of boring, turning, and facing operations on practically any material can be taken care of with a minimum tool inventory. A milled and brazed tool is taken from the tool crib and ground to suit particular requirements. Usually a finish ground tool ready to use is available in less than a half hour. In this way jobs can be tooled with carbide tools in a very short time.

Ramet

VASCOLOY-RAMET CORPORATION

NORTH CHICAGO, ILLINOIS

DISTRICT SALES AND SERVICE IN PRINCIPAL CITIES

IN CANADA: Carbide Tool & Die Company, Ltd., Hamilton, Ont.

4269

TANTALUM-TUNGSTEN CARBIDE

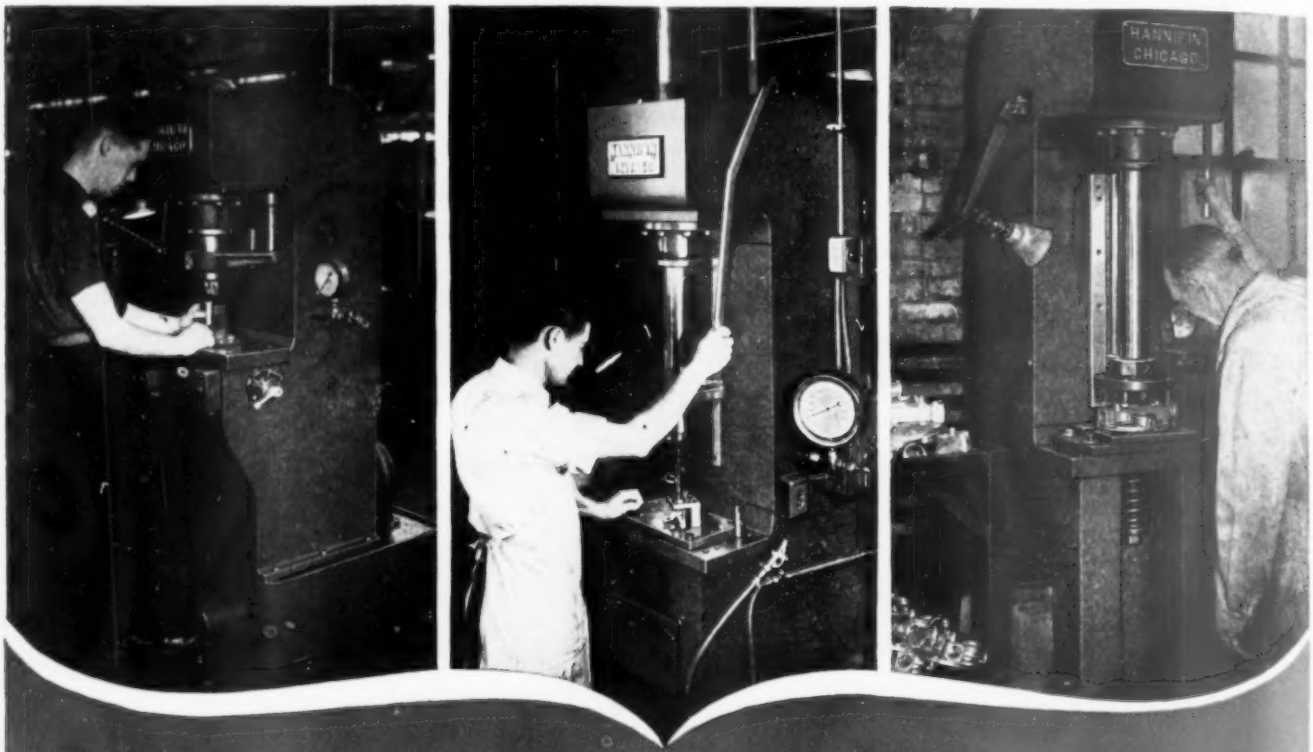
FOR TOOL SERVICE..... *Specify* Vascoloy RAMET TOOLS

TANTUNG "G"

5-ton Hannifin hydraulic press especially designed for marking operations. Note foot pedal control and adjustment set for short stroke.

5-ton Hannifin hydraulic press with long stroke, being used for broaching precision machine parts.

5-ton Hannifin hydraulic press used on a trimming and broaching operation on die castings.



★ Production's Ally

Standard presses readily adaptable to individual needs

★ These 5-ton Hannifin hydraulic presses are examples of standard designs, each with modifications in frame dimensions, table construction, ram speeds, and controls, to fit them to different production needs. These modifications are readily made in Hannifin presses of practically all sizes. The basic designs were developed with this in mind. And Hannifin engineers have a background of years of specialized experience with high production hydraulic and pneumatic equipment—experience that is proving especially valuable in meeting today's needs for fast, accurate production.

Hannifin standard presses, capacities 5 tons to 200 tons, include such desirable construction features as welded steel frames, built-in motor driven power units, high efficiency hydraulic cylinders, and a variety of controls including the exclusive Hannifin sensitive pressure control. If you have a problem of production involving the application of pressure—straightening, forming, press assembly, marking, or similar work—find out what Hannifin hydraulic press performance can accomplish for you. Write for press bulletin (No. 60) or consult Hannifin engineers for recommendations.

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MANUFACTURING COMPANY
621-631 S. Kolmar Ave., Chicago, Ill.

Detroit representative: R. A. BEAN, Hayward Building, 4829 Woodward Avenue • Telephone Columbia 4949

HANNIFIN
Hydraulic **PRESSES**

T.M. Reg. U.S. Pat. Office DECEMBER, 1942 Volume XI, Number 12

The Miracle of One Year

DECEMBER, 6, 1941. Europe bowed under the Nazi yoke; France impotent, Poland dismembered, Norway betrayed, Greece crushed by weight of numbers. England a shambles from repeated bombings, yet, doggedly persevering, an oasis of hope for exiled governments. Africa apparently destined to remain the Dark Continent for another "thousand years" as the Swastika lengthened its shadow and the dessert reddened with the ebb and flow of conflicting human tides. Russia, stoically defying blitz and panzer, the immovable object and the irresistible force in arrested action!

America, debating the pros and cons of intervention, haggling over lend-lease; our diplomats in grim conference with the envoys of the pretender to Asia's fabulous throne. Meddling and muddling, procrastination and indecision, political dissension and industrial confusion. Democracy on trial! December 6, 1941 — the deadly, brassy calm that preludes the first, furious blast of the tempest. Then, the fateful dawn of December 7th. Pearl Harbor! — and America outraged, galvanized into action, fused into an indomitable unity by the treacherous fire of enemy bombs. In turn, Bataan and Corregidor, black chapters of political unreadiness, to be erased by an epic of American heroism.

America, imputed "soft" by her traducers, reeled under the initial blast, yet breasted the gathering fury of the storm. Held! — and marched into its teeth! Came Midway and the Coral Sea, and the tidal wave of Japanese offensive was arrested, its force spent against the bone and sinew — and the intelligence — that is American manhood. In Africa, the Valkyrie flees before the Eagle and the Bulldog; France, renascent, responds to masterly Allied diplomacy and strikes again for freedom. *One year*, and Democracy stands vindicated!

LET US, NOW, shift the scene to the industrial front. In retrospect, December 7th, 1941 is a poignant reminder of America's unpreparedness. Our economy was geared to civilian needs, our powder mills but experimental labs for the gossamers of Milady's wear. Pearl Harbor changed all that, was the "open, Sesame" to a conversion program such as the world has never known. Wealth untold became so much dross as huge conveyor lines crumbled under the torch, while colossal machines, if not suited to war production were ruthlessly scrapped. Established industry cleared its unnumbered acres for action, huge plants, such as only Titans in daring and imagination might conceive, sprang up, began to produce while walls were still being reared. The President of the United States called for war production, and American industry responded. Witness December 7th, 1942.

We'll not go into astronomical production figures. They are military secrets in the first place, yet in a way open secrets that may well cause the enemy to regard, aghast, the giant he awakened. For ours is not the unwilling production of the enslaved, but the concerted effort of 130 million freemen united in one objective — Victory! From Arctic to subtropic Gulf, from Atlantic to Pacific, vast industrial armies toil to produce guns, tanks, planes and ships at rates heretofore undreamed. And food, that our fighters shall not want, that of all these things there shall be enough and on time. Like a benign geni, America's industry lends strength to the arms of Democracy's champions.

NOR WILL WE, the Tool Engineers, dwell on our part in this scheme of things. Sufficient to say that we were in the vanguard, planning the tools of production, that we won our spurs on the engineering front. No, there is other object in this writing. Let this be a Christmas message, not of merriness, nor exactly of happiness, since our hearts are heavy, but of hope. Could words alone assuage grief, we would console the bereaved whose loved ones have fallen in the line of duty. May we say instead that we *understand*, that we are with you in your sorrow, that we share your cold pride in the heroic action of *your* son, *your* mate, *your* brother? And to those who wait with icy dread for a possible fateful message, we say this: — have hope! For as coming events ever cast their shadows before them; (even though they may only be interpreted by the sages) so the miracle of the past year presages victory for the Allied nations. This, then, is our message:—That you have faith in America, and that you *produce*. And have courage! — hold high the torch!

ROY T. BRAMSON, *Editor and Publisher* JEROME S. WILFORD, *Managing Editor* ANDREW E. RYLANDER, *Technical Editor*
WALLACE A. SCOTTEN, RALPH E. DAVIS, ALBERT C. COCHRANE, *Associate Editors*

Tool Conservation begins in the Tool Crib

Know Where ALL YOUR TOOLS are ALL THE TIME!

No time is lost accounting for this reamer. The attendant hands it over to the operator in exchange for a requisition.

This wide window ledge, chest high, provides a convenient writing space and under it ample easy-to-get-at storage space for frequently used items.

Photos Courtesy General Electric Co. of Philadelphia

A PRACTICAL tool accounting system saves tools, time and money. One simple but highly effective method is illustrated here. Machine operators make out their requisitions on wide ledges or counters. When the tool is issued the requisition is hung on the "Out-Tool" board under the operator's own special number. It stays there until the tool is returned. This is a simple system, but highly efficient and speedy in practice.

Another proven practical plan is to exchange the tool for a metal tool check with the operator's number on it.

After all, the exact system used is less important than knowing where tools are and being able to issue them quickly. Wasting time at the tool crib window means lost time at the machine. These days America can not afford wasted time!

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASSACHUSETTS

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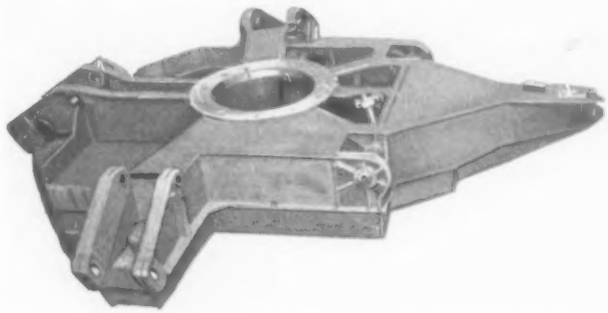
SINGLE-PURPOSE TOOLING for the 90-mm. Gun Mount

How special tools speeded production and saved 33 standard tools for other fabricators



E. H. JOHNSON

PRESIDENT

JOHNSON TOOL AND ENGINEERING COMPANY

FIGURE 1.

PHOTOS AND TEXT REVIEWED BY BUREAU OF PUBLIC INFORMATION, WAR DEPARTMENT

THROUGHOUT years of manufacturing tools, we have always tried to maintain a conservative policy to the extent that a tool of sufficient stability and effectiveness was the limit of our energy for the average job, and only in extreme cases of high production did we produce more complicated special machinery.

Today we are forced to engineer and develop new ways and means regardless of all previous rules and regulations.

Why use special machines?

Consider the machining of several parts used on the 90-mm. Gun Mount (Figure 1). These parts range from eight to fifteen feet long and from four to six feet wide and have numerous milled slots, drilled and reamed holes and facing operations. Ordinarily parts of this size would be machined on standard equipment, such as shapers, radial drills, vertical and horizontal mills, by some skilled mechanic in a spacious machine shop. Production would be at the rate of about two parts per week. However, with the present emergency facing us, including long delays in procuring standard equipment, we were faced with one alternative — special machinery.

Our engineers were given a brief outline of the operations to be performed and asked to create some efficient special machinery that could be built in a minimum amount of time, using standard parts wherever possible. In the meantime other engineers were searching for necessary perishable tools, gears, motors, bearings and other equipment. After a diligent search had been made and the preliminary sketches prepared, a round table discussion was held. At this meeting we found we would experience long delays in deliveries of strategic materials, that some were completely exhausted, and that substitutes must be found.

Concrete foundations

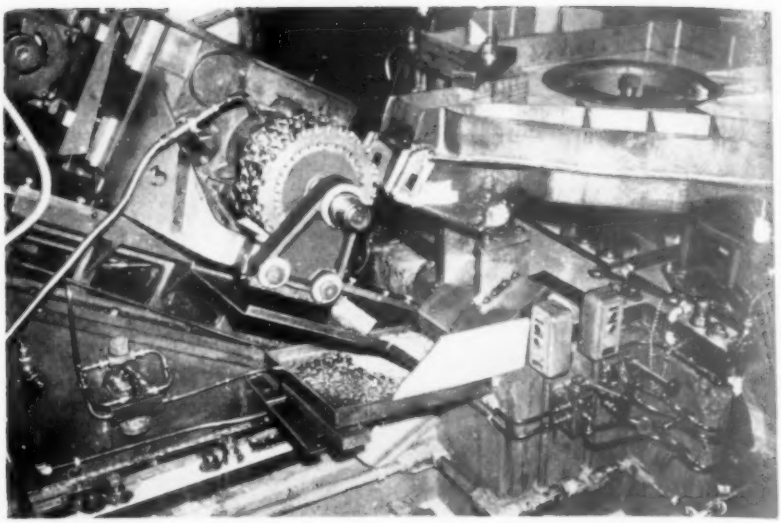
One substitution was the use of concrete foundations in place of the usual cast iron or welded constructions. Another measure was the adaptation of two standard units, one for milling and one for drilling, to every possible use throughout the entire program. Following these basic ideas the machines were designed and rapidly pushed through the shop. The gear boxes for the units were cast and machined. Gears, bearings and spindles were assembled and run in. The ways and slides were scraped and adjusted. Parts and units were then shipped to the customer's plant.

Welded construction

When the forms for the concrete were built, templates with one-and-one-quarter-inch hold-down bolts, accurately spaced were included. Around these bolts a fast drying concrete was poured to a depth of eighteen inches below the level of the floor. This was allowed to dry for five days instead of the usual twenty-eight required for ordinary concrete. Then several coats of transparent oil and water resisting paint were applied for protection against future deterioration and the foundations were then ready for use.

Upon these foundations three inch finished machine steel plates were laid, each plate having a series of accurately spaced holes. These plates were located over the protruding hold-down bolts, leveled by means of jack screws, and checked by a precision level. The nuts were then pulled down securely and the special machines started to take form. On these plates were placed welded constructions to add height and rigidity to the units and center supports. Upon these fabrications were placed the expanding locators, rest pads, stops, clamps, and milling and drilling units.

FIGURE 2.



(Right) FIGURE 3.

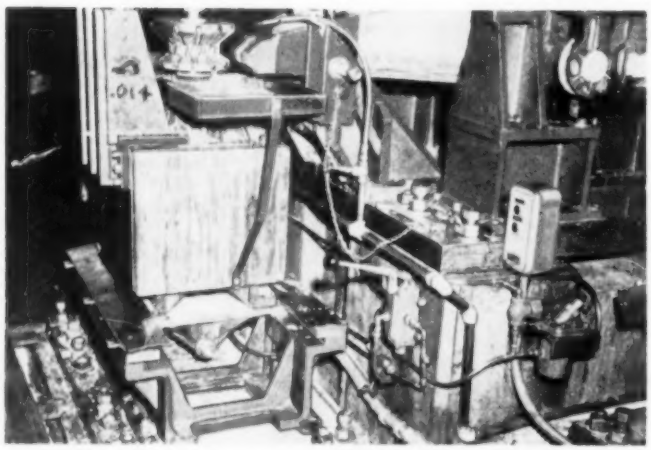


FIGURE 4.

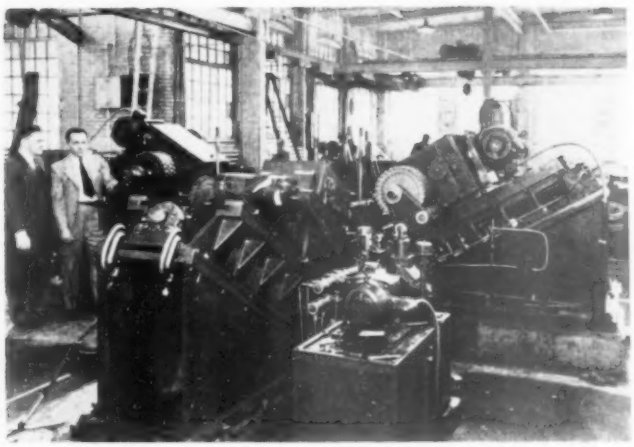


FIGURE 5.

FIGURE 2. The operations performed by the first machine were milling three slots six-and-a-quarter inches wide, five inches deep and twenty-two inches long, and form milling the end of the nose block.

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FIGURE 3. On each spindle of the three units was placed a combination of four staggered tooth cutters, fifteen-and-one-half inches in diameter by approximately one-and-nine-sixteenth inches wide. The six-and-one-quarter width was acquired by doweling together these four cutters.

FIGURE 4. The fourth unit was to make a form cut and upon this spindle we placed three cutters with specifically ground angles. This unit is identical except that it is mounted in a vertical position.

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FIGURE 5. All four units were started at the same time and functioned very satisfactorily. The actual time for loading, taking the cut and unloading was forty-five minutes. This reduced machining time eight hundred percent, saved considerable money, machines, floor space and men.

Hydraulic cylinders were then mounted on the bases and connected to the sliding units. These in turn were connected by one-half-inch copper tubing to the hydraulic pumps. We deviated here from standard practice by operating as many as five units from one pump. This worked quite satisfactorily in spite of the fact that we did not use an accumulator or any other means to smooth out the operation. Speed selector and the rate of flow valves were used to give the required feed rates for the various units. These valves could be set to produce a feed of one-quarter-inch per minute.

Saving in standard equipment

These special machines, not only saved approximately 75 per cent in hours, but saved 21 boring mills, seven radial drills, three shapers, and two milling machines. The floor space consumed was approximately 60 per cent less and the man power about 50 per cent less. The predominating factor of these machines was the simplicity of operation. Within a few short hours any inexperienced man or boy could be taught to become an efficient operator. The pressing of a button starts and stops the motors. The pushing of a lever started the feed and when it reached its required length it automatically stopped. The pulling on the lever returned it to its normal starting position. The rest of the adjustments were permanently fixed and further knowledge of manipulation was unnecessary.

THE END

FIGURE 6. The next operation required a similar special machine, except that instead of a milling operation, we were confronted with a deep drilling problem. The requirements were to drill and ream (three) two-inch holes twelve inches deep from three sides and mill a three-inch radius two inches wide on an eight degree angle. For the drilling operations we used three of the standard designed drilling units, which were equipped with variable speed rangers to compensate for the difference in R.P.M. for the various drills and reamers. Standard (two fluted) drills were used first and followed by core drills to correct any misalignment in the holes. In a few cases we found that they not only straightened the hole, but left the bore smooth enough to eliminate the reaming.

FIGURE 6.

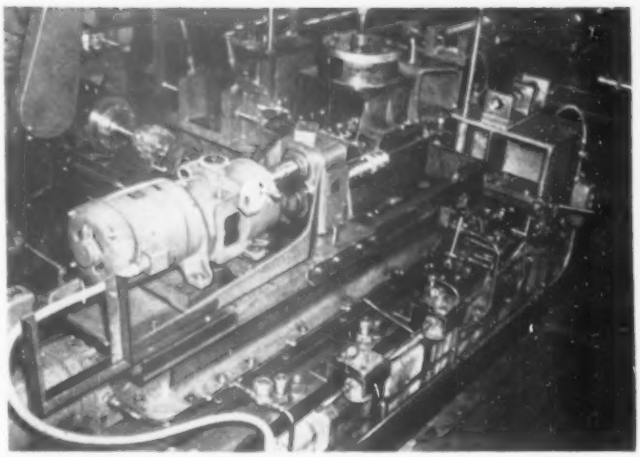

FIGURE 7.

FIGURE 7. The length of the holes, in addition to changing the tools, required a rapid forward and reverse motion. This was accomplished by a cam located on the side of the unit, which actuated a control valve. After the non-working distance had been covered, the cam depressed the roller, closed the valve and returned the unit to the correct feed for drilling. While this was taking place, the milling unit had taken the desired cut and the operations were completed. This machine not only saved considerable time and space, but held the accurate relations necessary between the holes, thereby reducing the possibilities of an error.

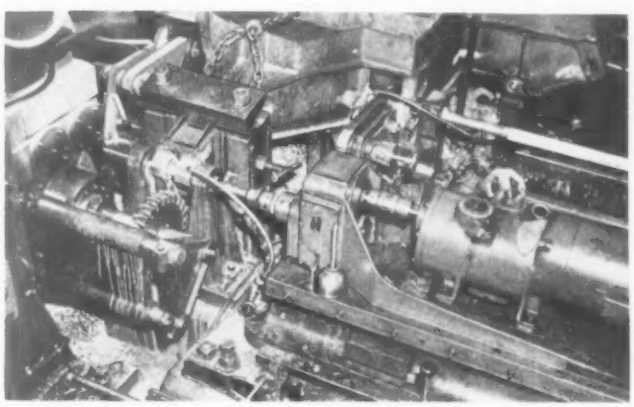

FIGURE 8.

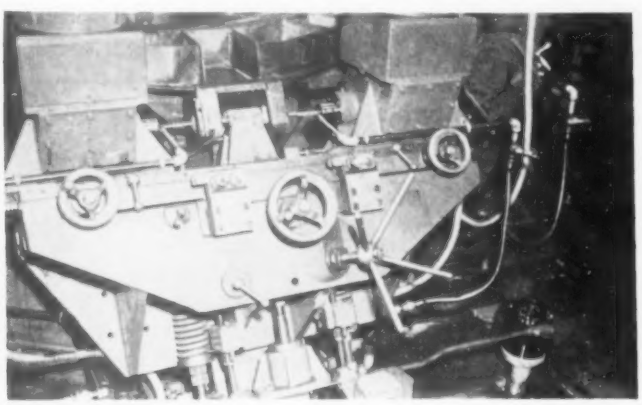

FIGURE 10.

(Right) FIGURE 9.

FIGURE 8. The operations of the next machine were first to bore a one-and-a-quarter inch hole, six inches deep, and mill a vertical slot two inches wide and six inches long. The vertical cut was taken by one of our standard units operating in a vertical plane. Counterbalancing was necessary to offset the weight of the unit and insure smoother operation.

FIGURE 9. The second operation was to drill and ream a two inch hole through six ribs spaced thirty-six inches apart and to spotface four inside bosses. This was done very similar to the previous operation, except that two units were used to bore and spotface, one operating from each side and in perfect alignment.

FIGURE 10. The last operation on this part was of a very unusual nature. Six square holes with close tolerances were to be milled. Broaching would have solved our problem, but we did not have time to wait for standard equipment and the cost was very great. A special head was designed for this operation. In each spindle a fast spiral end mill was used to overcome side pressure when cutting. Controls were arranged to operate each head individually or collectively, as the conditions warranted. The head then took a rectangular course and the operation was completed. This saved about one-third of the time required for broaching as all six units operated at the same time.

Our job only being started, we took the next part, which was a welded construction fifteen feet long and four feet wide. In this machine it was necessary to drill and line ream four two-inch holes spaced forty-eight inches apart. This was done by two accurately-aligned units, similar to one of our previous machines. Drilling five one-inch holes on an irregular bolt circle was accomplished with a special "U. S." indexing drill head mounted on one of our standard units. The spindle rotated the drills and they were fed hydraulically as before. To add to the complications, it was necessary to drill from both sides with two perfectly aligned units.

(Continued on following page)

FIGURE 11.

FIGURE 11. Included in this machine was another special designed head that milled eight inside bosses (four at a time). This head had four small mill cutters keyed to two shafts and driven by a worm and worm wheel on the spindle. The above operations took less than two hours from floor to floor. Half of operation is shown in drawing.

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FIGURE 12. The second operation on this part consisted of taking two vertical one-and-a-quarter-inch cuts two feet apart and milling an eighteen degree double angle slot through from both sides. These were comparatively easy as they were duplications of previous cuts and operations.

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FIGURE 13. The third machine had all of the characteristics of the others, except that after two parallel forty-five degree chamfers, eighteen inches long were taken, the units were swung on a ten-degree angle for a six-inch long clearance cut on the end. In the same operation another vertical unit milled a "U" shaped slot in the center. This completed the special machines necessary for this part.

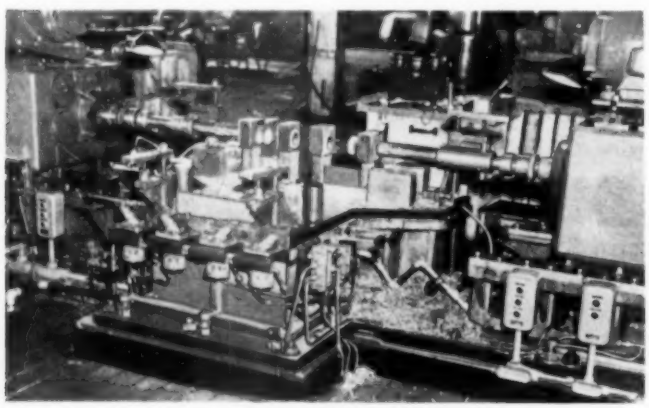

FIGURE 14.

FIGURE 14. In another part two bearing holes were to be bored in perfect alignment. This was accomplished by accurately setting two units in line and operating them toward each other. This would be impossible to do on standard equipment.

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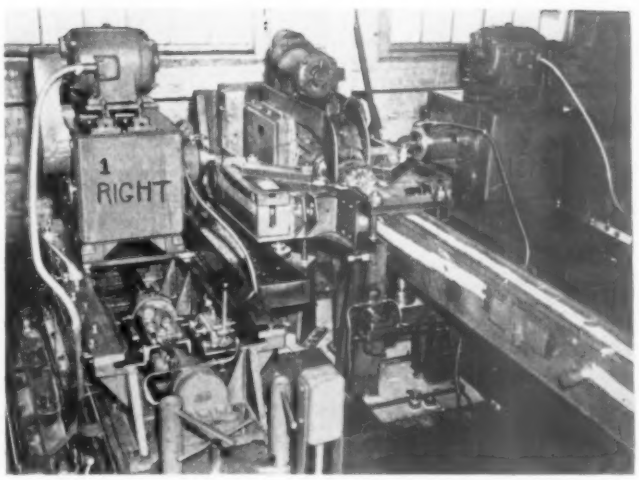
FIGURE 15. The next machine required the spindles of two

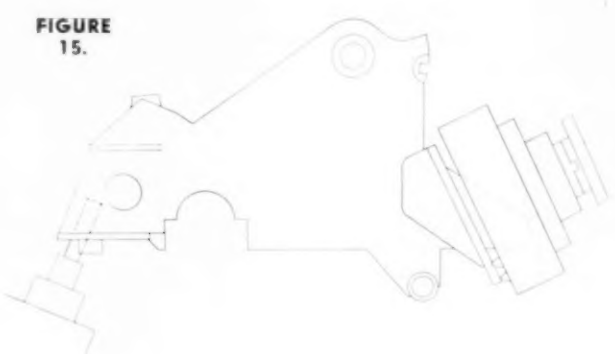
FIGURE 12.

FIGURE 13.



units to extend vertically. In these units the hydraulics were eliminated and they were controlled manually to a predetermined stop. This was entirely a blind operation where the operator could not see the metal he was removing from the two slots located inside of the structure. In this same machine two other units were used to face (two) ten-inch diameter bosses. Automatic Mumert & Dixon facing heads with single-point tool bits were used in the spindles. Each revolution advanced the cut until the required diameter was reached.

FIGURE 15.



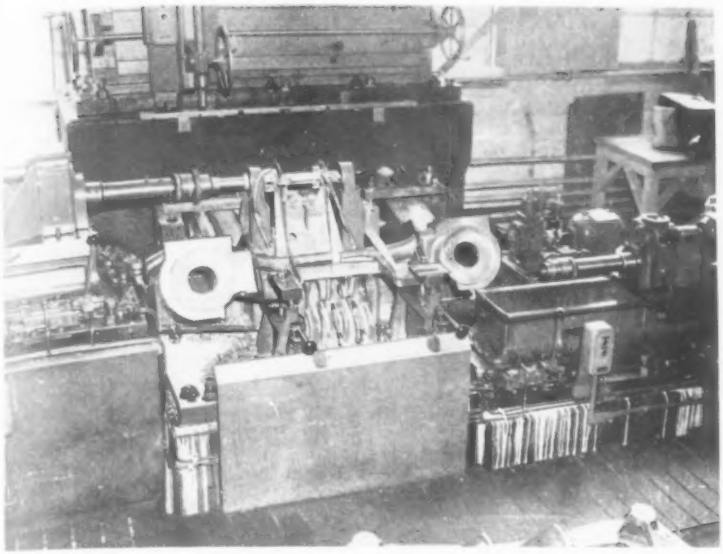


FIGURE 16.

FIGURE 16. Another machine was required to bore (one) two-inch hole and (one) one-and-three-quarter-inch hole, running parallel fourteen inches apart. These holes were also to be faced and back faced. This was done by two units operating from each end with the necessary drills and boring bars required for facing and back facing. A traveling drill press was added to enable the operator to drill an oil hole in one side and rapidly move the drill to a positive stop forty inches away and drill another hole, thus completing these operations.

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FIGURE 17. Another problem was the machining of one concave and one convex surface. The first part was located in a fixture on a Bullard vertical boring mill then a power driven cutting head was located on the cross slide. The table rotated in the usual manner and the cutting head moved the tool through the specified radius.

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FIGURE 18. The male part was turned in practically the same manner except the cutting tool traveled in a reversed condition.

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FIGURE 19. It was then necessary to lap the two parts. They were put together and an eccentric crank provided a rotary and oscillating motion. The motor rotated the speed reducer that revolved the upper part.

THE END.

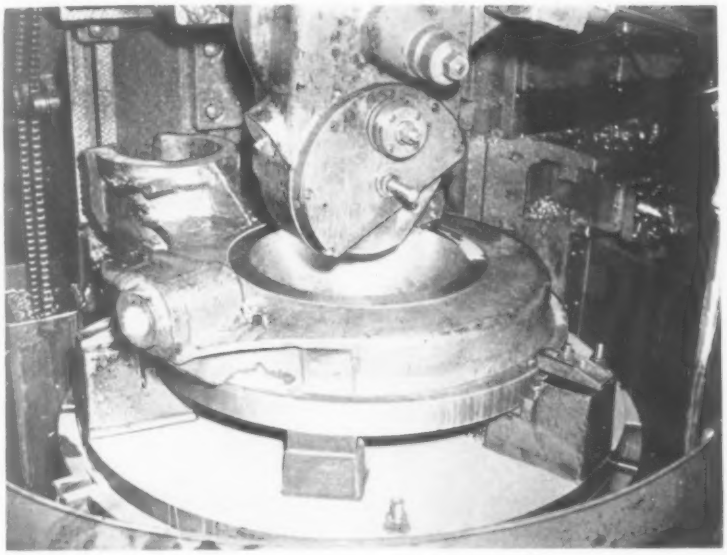

FIGURE 17.

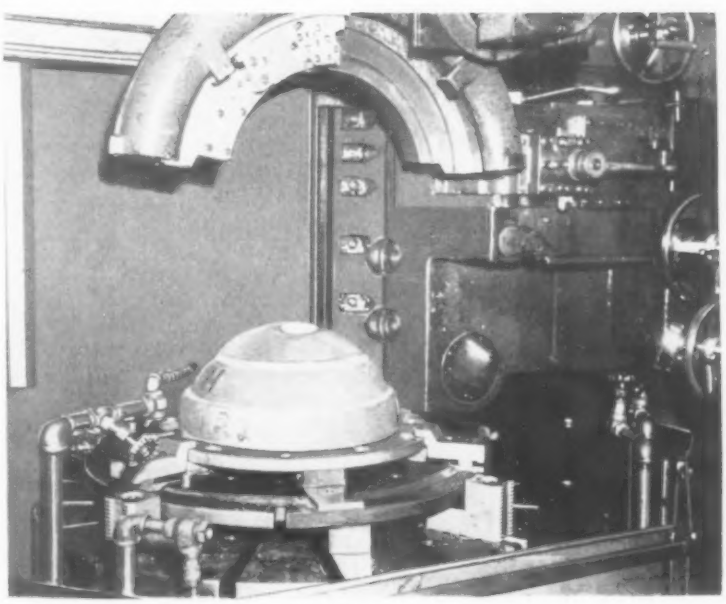

FIGURE 18.

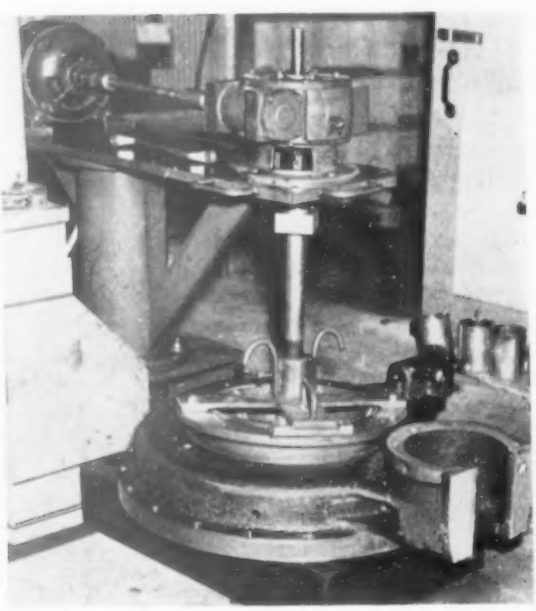

FIGURE 19.

The Application of HARD CHROME PLATING

ABC's of a proved process for salvaging worn tools and prolonging new tool life

R. M. GOODSELL
PLATING SUPERVISOR
RACINE PLATING COMPANY

OF THE MANY practical factors to be considered in connection with hard chromium plating of jigs, dies and tools, particularly important are the operating factors necessary to successful and permanently adhering deposits. Such factors apply to all applications — new tools or worn tools which can be reclaimed at only a small proportion of their original cost.

Hard chrome is entirely different from decorative chrome in nature and is nearly always plated directly to the base metal, which is most frequently steel. There are two kinds of plating — flash plating and heavy or specication plating. Flash plating is of a thickness up to approximately .0002-inch. (Note the difference from decorative, .00003-inch. It usually is not finished by grinding or lapping to size afterwards. Heavy plating differs only by being thicker than flash plating. The preparatory cost is the same for both.

Hardness depends on base metal

Concerning the hardness of chromium in the deposited state to base metals, there is quite a variance of opinion. In Mohs scale, chromium is third. Carbon, in the form of a diamond, is first and boron is second.

However, in order to get the correct hardness reading of any metal, it must be hardened to a depth of .027-inch. If chrome deposits were of such a thickness, it is doubted if it would be possible to secure an instrument to make the tests upon chrome alone, as it is undoubtedly so hard that the reading would be beyond any scale provided.

The chrome deposit is influenced by the grain structure and hardness of the metal on which it is applied. Due to the difference in the base metals, the hardness of the chrome plate varies under tests. If it were possible to remove the chrome deposit from the base metal in one piece and make a test on the chrome only, identical readings would be obtained for samples of the same thickness.

Successful adherent deposits are largely dependent upon the knowledge and skill of the operator and his proper understanding of racking, temperature and current densities necessary to secure the most satisfactory results.

Importance of cleaning

One of the first essentials is cleanliness of the work or parts to be plated and this factor cannot be too strongly emphasized. While ordinary cleaning methods might suffice for many classes of work, proper adhesion of hard chromium on tools requires that little "something extra" that goes beyond the normal cleaning cycle. A scouring or scrubbing operation should be used prior to the regular cleaning cycle. The cleaner itself should be properly built up and should contain a suitable wetting agent to provide for penetration and to surround any particles of residual soil so that they can be lifted from the surface and rinsed away. Spray rinsing where the beneficial effect of fluid friction may also be gainfully employed is beneficial.

A fact that seems to be well established is that any grinding or cutting down, or what are sometimes referred to as "emerying" operations, should be carefully performed. Even after cleaning, a surface which has been ground or dressed preparatory to further operations should be closely inspected for checks or cracks which are likely to follow an "emerying" operation, and especially on hardened steel parts. Any residue of either abrasive or metallic particles imbedded in the minute scratches left on the surface from the grinding operation should be removed. On fine edge tools the use of an ordinary magnifying glass will tend to make double assurance that such residual matter is not clogged on the surface. Whether the surface has a very finematte finish or high lustre finish is not material if the cleaning operation is all that it should be. The plate will be equally adherent in either case.

CUTTING TOOLS

EXPERIENCE HAS SHOWN that tools and gages hard-plated will withstand abuse and wear for an exceptional length of time. Surfaces are readily finished to a high degree of smoothness by grinding and lapping. It has been found that any degree of accuracy that can be produced in steel, can be reproduced on chromium plate. The process very often tends to lessen the labor required to maintain the accuracy necessary on some types of tools.

There have been various tests made as to the value of hard chrome plating tools for cutting, and while some have not shown enough advantages to warrant their cost, others have more than tripled their life. Tools which have been plated in the largest quantities are drills, reamers, taps, milling cutters, end mills, counter boring tools and forming tools of various designs, such as are used on turret lathes and on automatic machines. They are used to cut cast iron, malleable iron, mild steel, brass, copper, aluminum and die-cast zinc. They are also used on such materials as bakelite, hard rubber, wood, marble, plastics and slate. In fact, hard chrome plated cutting tools are finding application in machining practically all the materials used in industry.

One concern reported that chromium plated files were responsible for a 20 per cent reduction in finishing cost on a given amount of production, also that plated files were much more acceptable to the worker than unplated. The principal advantage of this type of application, seems to be in the failure of other materials to adhere to a chromium surface.

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Hard chromium plating of cutting tools differs from the plating of arbors, gages and dies, inasmuch as the deposit has a tendency to build up on sharp edges. This can be largely eliminated by the use of guards placed directly in front of the cutting edges. Drills may be successfully plated by using lead wire inserts in the fluting. These should be securely fastened at the top and permitted to extend downward and over the cutting edge.

On cutting tools a plate thickness of .0002-inch is recommended, but deposits of as much as .008-inch have been successfully applied. They may have been ground to given size afterwards with considerable success. The temperature of the solution for this type of plating should be 150° F., with current density of four amperes per square inch. The part to be plated after being properly cleaned is first dipped in hot water then operated on reverse current in regular chrome bath for ten seconds then placed directly in the plating bath. The maximum of current should not be immediately applied, but stepped up slowly until the proper current density is reached after which the parts should be kept in the bath until the required thickness is obtained.

Though chromium, as deposited in thin layers is only as hard as the base metal, the plated surface may prolong the life of the tool as much as ten fold.

Three varieties of chromium plating are generally recognized: a hard deposit, a tough and ductile deposit and a soft deposit. All three types have their respective uses in the plating of cutting tools, dies, arbors and broaches, and each is secured through proper manipulation of current density and temperature.

GAGES, ARBORS, FORMING DIES

ARBORS, PLUG GAGES and similar tools can be plated by using a current density of eight amperes per square inch. The procedure is as follows: Parts should be given a clean surface and it is suggested that the use of Lea Compound on a well worn, carefully cleaned buff functions well. After racking the parts should be immersed in cleaning solution and carefully rinsed in hot water. After 10 seconds, in regular chrome bath operated on reverse current, they are placed directly into the plating bath, using the same graduated method of applying the current by successive stages as is used in the plating of cutting tools.

Where deposits of as much as .015-inch to .020-inch are required, a current density of six to eight amperes per square inch is suggested, but it must be borne in mind that ends should be guarded to avoid the building up of an excessive deposit. Such tools may be readily plated to oversize dimensions, and it is possible as well as practicable to then grind them to required sizes.

Forming dies may be successfully plated with thickness of deposit not to exceed .0015-inch on a side. However, deposits of as much as .005-inch have been deposited on badly worn dies with considerable success when the soft ductile variety of deposit is used.

LACQUERS, FIXTURES AND ANODES

WHILE MANY PARTS are over-all plated there are others where it is necessary or desirable to plate only a part of the surface area. Numerous manufacturers have developed efficient stop-off lacquers which, as required, may be brushed on, dipped or sprayed to give almost 100 per cent protection. In using such lacquers if more than one coat is required, each coat should be permitted to dry thoroughly before a subsequent coat is applied. By first masking areas not to be plated with tin or lead, and then coating the masked areas with stop-off lacquer no metal will be deposited.

There is of course the requirement of auxiliary anodes for properly plating deeply recessed areas or inside

It is said that 50 percent of hard chrome plating failures have been caused by lack of complete knowledge given the plater as to the use of the part to be plated. It is also imperative that no hardening strains be in the part.

STEPS IN HARD CHROMIUM PLATING

1. Preparing the work for plating. This includes polishing or Leaing operation.
2. Cleaning. By running the work in any commercial cleaner.
3. Rinse and acid dip.
4. Place in chrome bath, reverse current 10 seconds; use the article to be plated as an anode.
5. Plate in regular plating bath equipped with a rheostat for stepping up current to the required current density; use work to be plated as cathode.
6. Plating time: for best results, .001-inch per hour.

These steps apply to all tools except taps which are given a jolt of approximately 10 amperes per square inch, and then reduced to four amperes per square inch to avoid feathering up on the edges.

surfaces of bushings and like parts. Such auxiliary anodes can easily be made to conform to respective conditions.

TYPE OF BATH

Temperature and Current Density

FOR RAPID DEPOSITION of plate the temperature of the bath is important. With temperatures up to 165° F. deposits of up to .003-inch per hour are easily secured on plugs and arbors, and such deposits will be both hard and smooth.

Perhaps the most frequently overlooked factor in the successful application of hard chromium plate, is the consideration of the physical properties of the underlying base metal — the metallurgical factors.

It would be safe to say that 50 per cent of the failures of hard chrome plating have been caused by lack of complete knowledge given the plater as to the use of the part plated. It is important that the plater is given when possible the analysis of base metal to be plated, and the purpose for which it is intended, and any special conditions which are to be overcome. A close adherence to this rule will produce a better product and will enable the plater to know the grade of plate to apply.

There is no difference in the character of the bath used for hard chromium plating and bright chromium plating, as the plating itself will largely reflect the degree of skill used by the plater in the set-up and operations on the parts to be plated.

It is common knowledge among the tool and machine manufacturers that a tool, die or machine can be made too hard for the purpose for which it is intended. The part also can be hardened, but not drawn with the proper care, thereby leaving what is known as residual hardening strains. When hardened steel parts are to be chrome plated for wear and resistance to corrosion, it is imperative that it be as free from hardening strains as possible. In order to secure this condition it is necessary to exercise careful supervision over the heat treatment and mechanical design of the part to be plated.

The reason for this care on the part of the manufacturer is two-fold. When it is required to deposit a hard chrome plate on the part to the extent of .005-inch or over, the part will be exposed to the action of the electrolyte for hours, and during the plating period there is a violent effusion of hydrogen gas in close proximity to that part. It is only natural that a part of that hydrogen is included in the plate, and this tends to increase the hardness of the plate.

It can be readily seen, that if the heat treatment has not been properly accomplished, and the part has been left too hard, that the action of the electrolyte will, in all probability, cause the part to be defective in the final finishing operations.

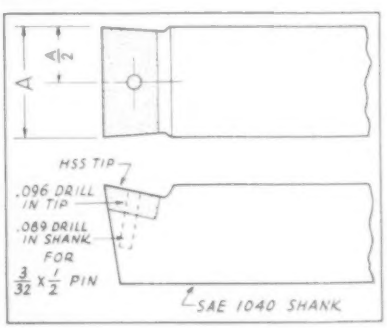
While the hydrogen that might be included in the deposit might cause difficulties in final grinding and lapping, there is a remedy that can be employed, and that is to subject the part to a temperature of 300° C. or 570° F., which tends to expel the hydrogen in the deposit. This process does not take away any of the hardness or value of the hard chrome plate. Then grind or lap the surface of the plated part. Finer results are obtained this way on all hard chrome deposits.

THE END

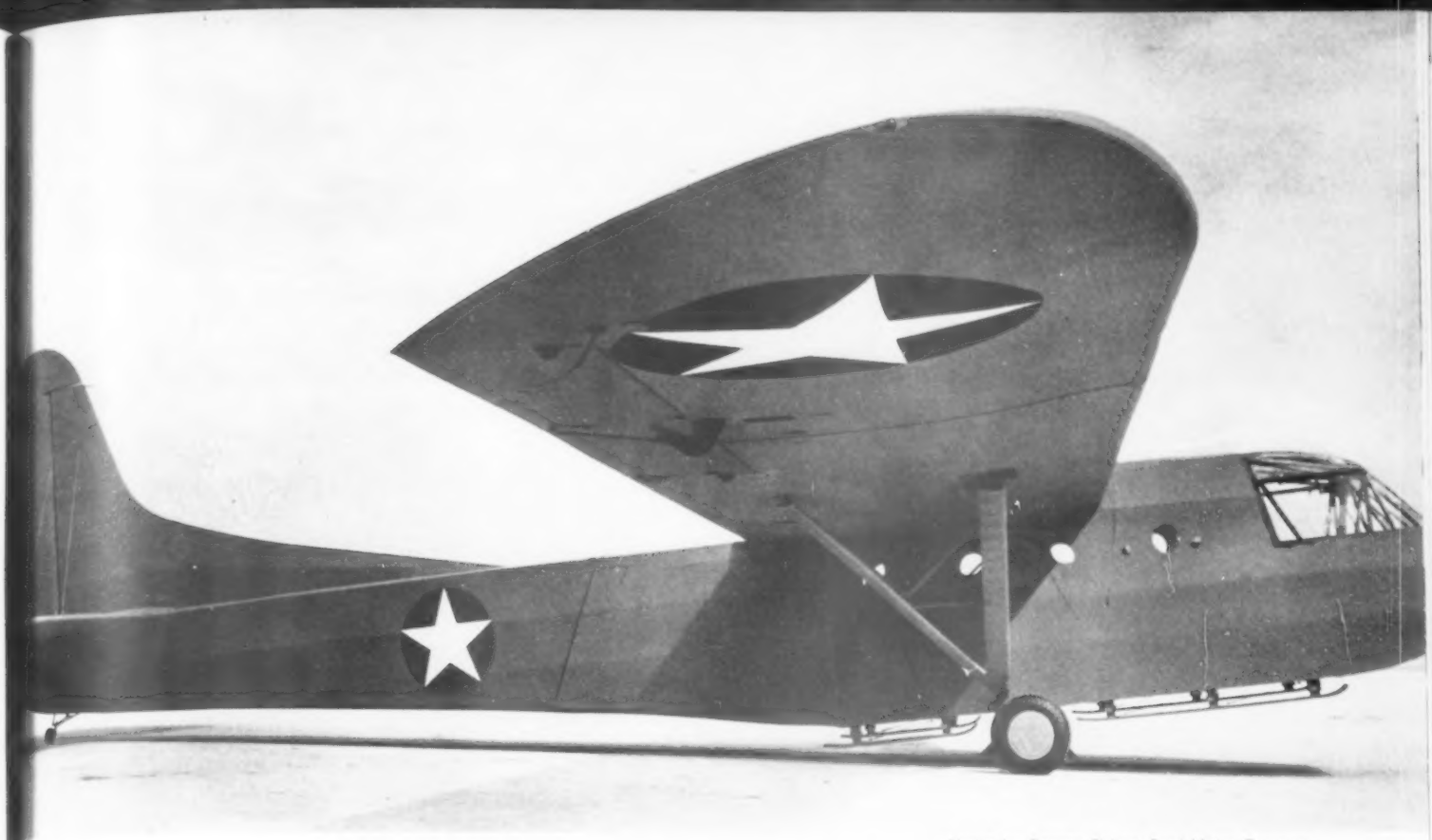
TIPPING TOOLS WITH HIGH SPEED STEEL

One large machine tool builder did not wait for the perfect method of tool steel conservation. While working on a method of brazing or welding high speed steel to ground steel shanks he devised a temporary measure with possibilities for various applications.

This new method involves the cementing of a high speed steel tip to a SAE 1040 shank. Heat is necessary to fix the cement.



To prevent the expansion of the shank from crowding the tip and forcing it beyond the support of the shank while the cement is soft, a pin holds the tip in position.



Photos by George Ebling, Ford Motor Company

Ford-built glider carries 15 invasion-equipped soldiers. The motorless ship has a wing span of 84 feet, weighs approximately 3,000 pounds.

Tooling Methods for Mass Production of CARGO GLIDERS

After steel for jeeps, armor plate for tanks and aluminum for bombers, Ford engineers tackled plywood for 15-place gliders. They are mass-producing them now.

SINCE THE GERMANS' successful use of troop gliders in the invasion of the Lowlands in 1940, in capturing Crete and in supplying Rommel's desert forces, all countries have come to recognize the value of what was once a sportsman's toy as a military weapon. In the United States, plans for building huge motorless ships for war use have been underway since early 1941.

One of the largest contractors for the manufacture of gliders for the government is the Ford Motor Company. While most of the other companies working on this project obtained their tools, dies and fixtures from one supplier, this organization undertook the task of doing their own tooling.

Ford-built tools

Ford engineers felt that they would obtain better results if they controlled the designing and building of their own tools and permission for them to do this was granted by the Army. Ford was one of the first companies to be entirely tooled and go into production.

When the auto tool designers were assigned to the job of tooling for mass production of the 15-place glider, part drawings were still in the preliminary stages on the drawing boards where company engineers were making their own set of full-scale, detailed drawings from the original Waco design. None the less, the designers, with the close cooperation and assistance of the engineering department proceeded on the designing of the fixtures, dies and gages. And by the first of June a sufficient number of part prints were on hand to get work really underway.

At this time, about 290 tool designers from 30 outside concerns were borrowed to work on the project at the Ford Airport in Dearborn, headquarters of the glider development work. They were kept busy until the middle of August when the job was enough completed to permit them to return to their own plants. About 60 Ford men were working on the job at the same time.

One difficulty encountered by the department was that this work had to be carried along with another larger program of tool designing for an additional war project. Besides the trouble created by carrying on two parallel programs, the designers had to contend with problems in regard to glider manufacture that they had never met in their former experience.

Steel to aluminum to plywood

To begin with, only two years previous, these men were designing tools for automobile production where fabrication of steel was the principal problem. Then they were given the job of designing tools for making the B-24 bomber where aluminum was the prime metal. Now, they had to switch to a glider project where steam drying and forming plywood and steel tube welding problems were the rule.

Thus many of the principles of tool design which were applicable to automobile production or bomber manufacture had to be forgotten and new ones applicable to wood had to be learned.

160,000 hours to tool

At the start of the project, the engineering department divided the ship into 20 sections for convenience in shipping. This division was used as a basis for estimating how long it would take the company to tool up and start production.

The number of hours that it would take the engineering department to make its drawings, the time for the tool designers to draw up tools, the hours required to manufacture them and the try-out time were all figured. The total number of hours from the time the first drawing was started until the last fixture tried out was estimated to be about 160,000 hours. Except for the extra time consumed because of alterations, this figure proved to be quite accurate.

The building of regular gliders, let alone a military model, has never been done before on a production basis, so the tool designers had very little information with which to work. As the fuselage framework is of steel tubing, necessitating some 300 welds, welding fixtures and tools had to be developed for production.

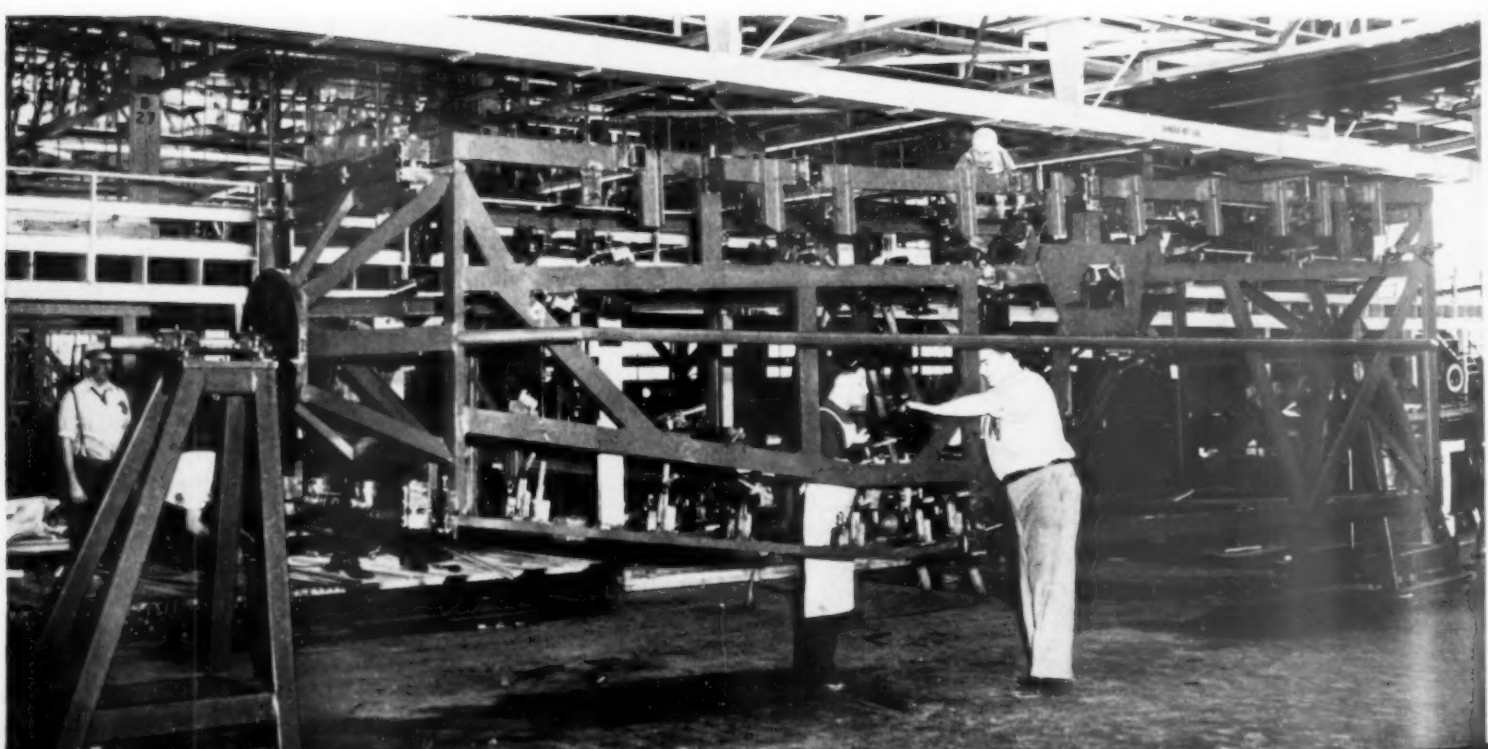
For shipping purposes the fuselage has been divided into three sections; nose, center and tail. To meet the welding problem for each division, three trunnion fixtures were designed by which the separate units can be rotated to any of four positions, making joints easily accessible. During the welding, each tube is held in position by quick-action clamps, a device borrowed from auto body manufacture.

The wings of the glider are bolstered by wooden ribs of varying sizes and a large part of the surface is covered with plywood skin. To turn wing sections out on a production basis special tools and fixtures had to be created. Many parts of the glider are made of wood and have to be glued together. The resin-type glue used, while stronger than the wood itself, takes eight hours to dry at room temperature. Thus for production purposes a method of quick drying the glue presented another problem.

Gluing plywood to ribs

One fixture was designed for gluing the plywood skin to the ribs and spars of the wing quickly by use of a thermo-pneumatic principle. Both heat and pressure are applied to the gluing surface, reducing the gluing time from

As the fuselage framework of the glider is of steel tubing, necessitating some 300 welds, welding fixtures and tools had to be developed for production purposes. Trunnion fixtures — one for each of three sections, nose, center and tail — to permit the rotation of separate units to any of four positions, making joints easily accessible. During welding, each tube is held in position by quick-action clamps.



hours to minutes.

Another fixture for quick gluing of the rib members to the spar combines a pressure clamp with an electrically heated base of a flat iron type.

For contour molding of the plywood wing surfaces a heavy concrete die was designed which could be easily made, using no vital materials. Lined with steel piping to carry steam to heat it, the die suitably replaces one made of metal.

4,300 tools required

Those are some of the problems that the Ford tool designers had to face and the methods by which they overcame them. The one thought they had to keep in mind at all times was: "Make it adaptable for mass production purposes." That they have done.

The main part of the designing work was done by the middle of August. Tool designers' work since that date has been limited to making alterations necessitated by plan changes.

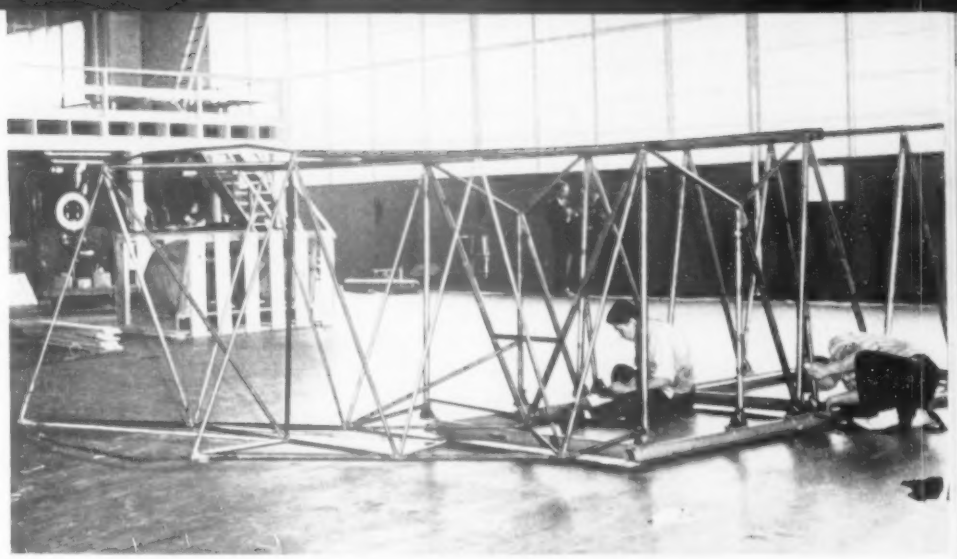
A total of 4,300 tools was required to put a Ford factory, where the ship is to be produced, into regular production. This required the drawing of approximately 4,000 designs. To enable other concerns contracted by the government to build the glider and tools for its manufacture, the automobile company placed its designs at their disposal. In addition they granted the Army permission to use any design changes or improvements that they might make on the glider and covered by Ford patents with no royalty fee.

30 tool rooms

The building of the tools for the Ford glider factory was divided among the Rouge Plant toolroom and 30 outside tool-making companies. These sub-contractors were asked to inspect tool drawings and to pick out those that they thought they could best make. This resulted in a quicker tooling of the factory than could have been possible had Ford undertaken the job himself or assigned it to only a single company.

As the fixtures and tools were delivered they were set up in and tested by actual glider manufacture and then sent to their final destination in the Ford plant hundreds of miles away where production is under way.

THE END



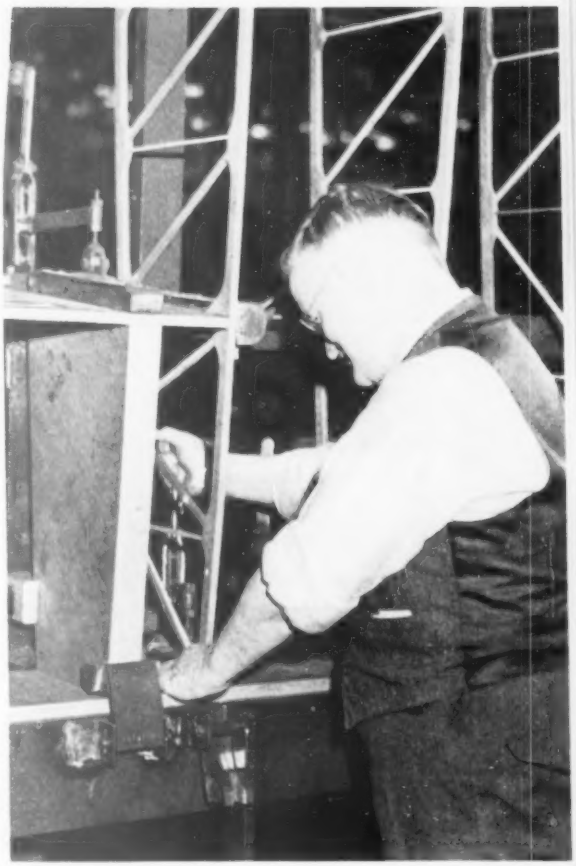
Finishing touches are applied to this center fuselage section of the glider just after it has been removed from the giant trunnion fixture in which it was welded. The one illustrated above was first to be welded in the new fixture.

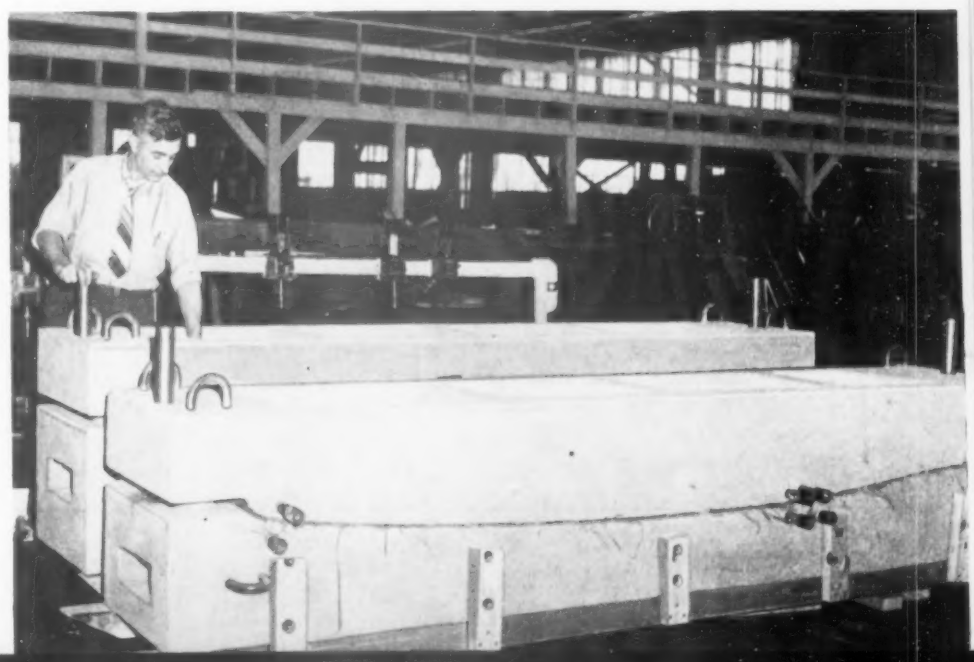
●

In the forming of the glider wing, wooden ribs are glued to the spar. Ford engineers designed a steam cabinet on top of which is laid the spar. Pressure clamps hold the ribs against the spar and heat and pressure assure a quick, firm bond.

●

For contour molding of the plywood wing surfaces of the glider, a heavy concrete die was designed which could easily be made, using no vital materials. Lined with steel piping to carry steam heat, the die suitably replaces one made of metal.





TOOL SALVAGE

LARRY W. LANG
NATIONAL TOOL SALVAGE COMPANY

CUTTING TOOLS, the material and class of labor necessary to produce them, are *critical*. The situation does not improve. Though the process of tool salvage, with the possible exception of welding is likewise well known, many shops are using it only as an emergency stop-gap, and not as an integral part of their tool and production program.

Fundamentally, tool salvage is the process of gaining the maximum life from tools. Modern operators do this by grinding, an economically sound method wherever the worn or broken tool is of sufficient value to offset the necessary expense to restore the tool to useful condition. Thus all but the smallest cutters are salvageable.

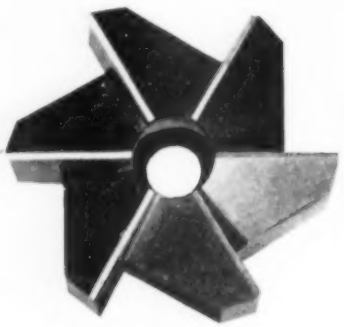
▲ ▲ ▲

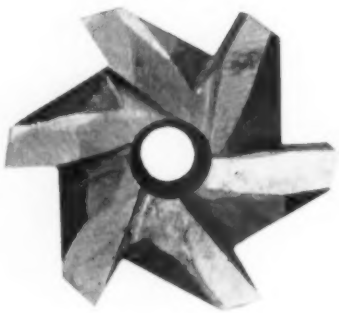
Some weeks ago, Mr. Donald Nelson said, "A thorough salvage program in a factory cannot only help meet the present emergency, but can help prepare that factory for its post-war operations through the elimination of once wasteful practices. The first thing to do is to put some one individual in charge of salvage in all departments and give him not only responsibility to act, but authority to act."

The shop which tries to set up a tool program without adequate provision for salvage operations is not only derelict in its obligations to war production needs, but is providing itself with continuous headaches. There are well known and recognized ratios of tool equipment to production schedules; and there are equally well recognized normal life expectancies in various types of tools, but these factors are seldom figured so as to provide either time or tools for systematic salvage operations, so as to gain the maximum life from the tool equipment and, incidentally, to provide against frequent interruptions in production schedules.

▲ ▲ ▲

From the standpoint of keeping currently needed tools in condition for use, there is no better place to fix the responsibility than on the man who is responsible for crib stock. Whether that is a crib supervisor, tool room foreman, or the crib foreman is merely a matter of shop size and set-up. The man who takes them in from the shop for sharpening or for return to their pegs or bins is in an excellent position to say whether the tool can be used again, to know how much it is used, how many of its kind are in

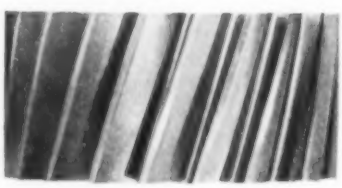




To get one more cut from these tools, chip room has been obtained by grinding off at a tangent. Result is to pack chips against pilot.

Tools, except for essential dimension tools, are cleaned up to largest possible size. New size markings are etched to the nearest sixteenth.

Reamers, two-lip end mills and other tools for producing finished dimensions, are brought to largest standard or specified size.



Plain mills hold their originally marked width and are finished on the O.D. to the largest size to which they can be cleaned up, unless otherwise specified.

TABULATION SHOWING ESTIMATED LIFE OF CUTTERS, NEW AND RECUT

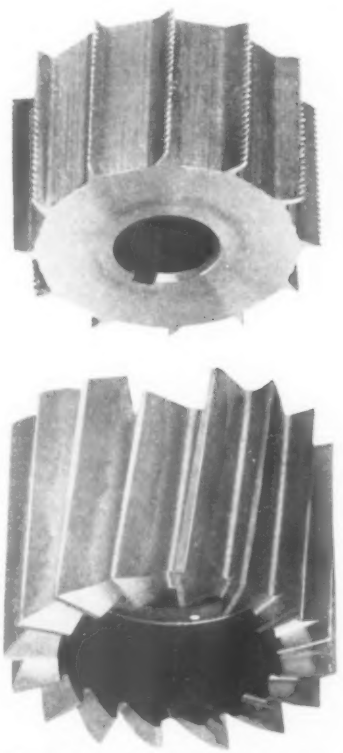
CUTTER	First Cost	Life in Hours	Re-Grinds	Scrap Value	Recut Cost	New Life in Hours	Re-Grinds	Scrap Value	Net Saving
8 x 3/16" SAW	$11.88	250	15	$ .53	$ 7.92	225	14	$ .50	$3.96
6 x 1" SIDE MILL	$19.88	375	25	$1.20	$11.36	350	24	$1.00	$8.52
1-1/2" END MILL	$ 9.31	250	15	$ .30*	$ 5.32	225	14	$ .25*	$3.99
4 x 2" SHELL MILL	$16.38	450	30	$1.50	$ 9.36	425	28	$1.25	$7.02
1" T. S. CHUCKING REAMER	$4.40	240	30	$ .38	$ 2.75	240	30	$ .35	$1.65

*** Usually have carbon shanks. (Scrap value based on $.30 per pound.)**

stock, and when it should go out for recutting.

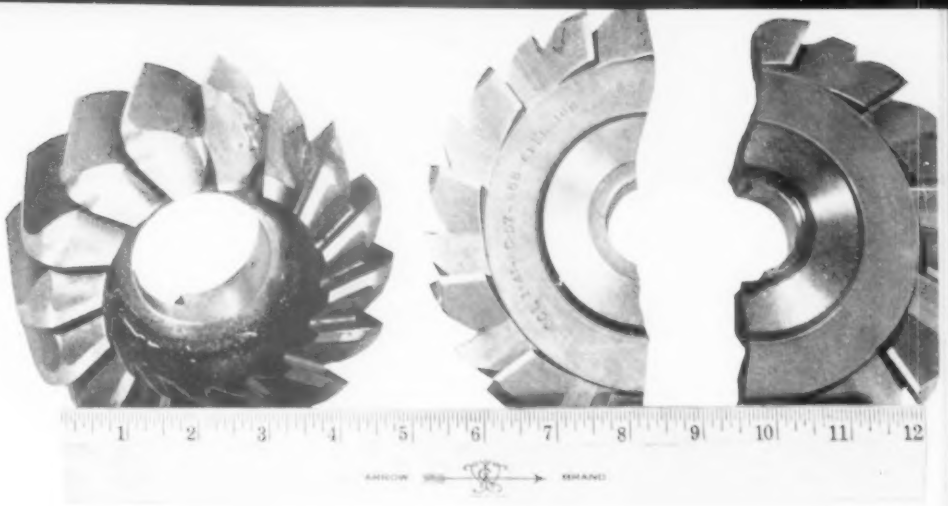
He usually knows, or can be informed of contemplated runs, and can come close to knowing exactly how many must be continually available. Most tool engineers are quick to agree that maximum tool life is always desirable from an economic standpoint, but too many seem to have failed to see that it is now an imperative national necessity.

One bad example is that of a nationally known manufacturer who is operating 24-hours a day on a schedule



Worn thread milling cutters converted to shell end mills. Not an economical job for the customer, and not a desirable one for the salvage shop, because of the excessive amount of grinding required. At the time, it was the only way out.

which will run nearly six years. Shell end mills are used on multiple spindle special machines, a standard practice for many years. Six such cutters are in simultaneous use when under full operating conditions. Several weeks ago, this plant shipped 835 shell end mills at once to be recut, the first shipment in more than three years. Picture the cutter inventory? And worse than that, think of how that plant has deprived other cutter users by accumulating such a stock. THE END.



WELDING BROKEN TOOLS

FOR YEARS, experiments have been made in welding, brazing and soldering broken and damaged cutters, and the present war has stimulated activity in it. Expensive tools can be wrecked early in their lives, and here are shown two typical examples, one fractured, one with teeth torn out.

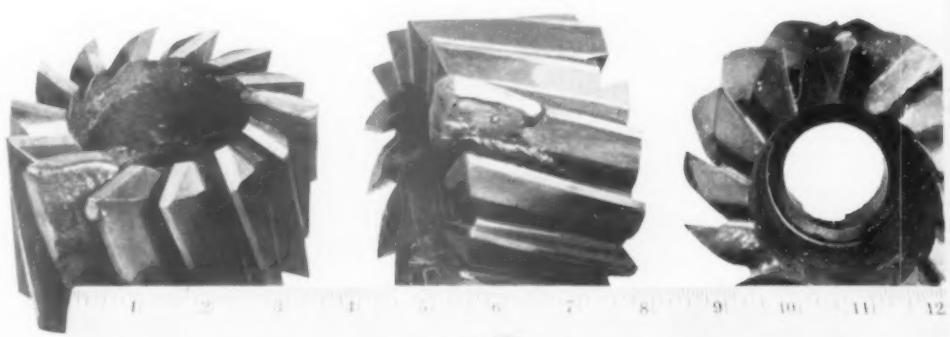
To scrap these is too often a desperately serious matter. The hydrogen atomic process has been used for many years, but it involves annealing, certain preparatory machining operations, welding and reheat treatment. Final failure is common, but on costly or critical pieces, it has been worth the risks.

For several months, now, a new rod and technique have been in use. No annealing or reheat treatment is involved, and no preparatory machining is done. In a wide variety of cases, several months have passed without a known failure, but the process is offered still as in a state of development.

WELDED surfaces Rockwell slightly lower than original surfaces, but the welding metal resists abrasion and no difference in wear between teeth is apparent. On breakdown tests, additional original teeth have ripped out while welded surfaces held. Cost at present is governed by the amount of welding and subsequent grinding required. At present, it is economically unsound in most cases to use this process where the cutter is worth less than $40.00. Where the cutter is that valuable, the cost will vary between 30 percent and 80 percent. If in addition to welding the teeth are **all** flat and complete salvage operations have to be done, the cost may approach the 80 percent figure.

Form relieved teeth present the same obstacle to welding as to recutting, namely the inability to restore truly accurate relieved form by regular salvage grinding equipment. Nothing is to be gained if a form cutter is all welded up and the affected teeth cannot be successfully restored to correct dimensions and form.

Specimens of shell end mills on which one or more teeth have been restored by means of welding.

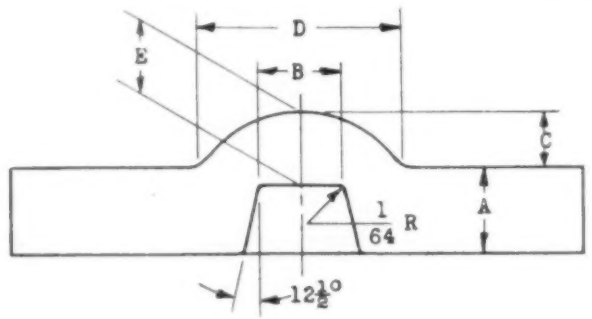


Design of Welding Embosses and Locating Buttons in Stamping Manufacture

STANLEY R. COPE

PRESIDENT
ACME SCHOOL OF DIE DESIGN ENGINEERING

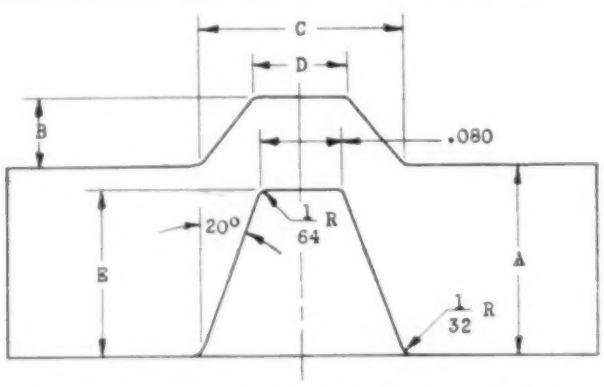
DRAWINGS BY
RAY JOHNSON



GAUGE	A	B	C	D	E
13	.0937	.075	.050	.180	.065
14	.0781	.075	.050	.180	.065
15	.0703	.075	.045	.172	.055
16	.0625	.060	.045	.172	.050
17	.0562	.055	.040	.156	.045
18	.0500	.050	.040	.156	.040
19	.0437	.050	.040	.125	.035
20	.0375	.050	.035	.125	.035
21	.0344	.050	.030	.125	.030
22	.0312	.050	.030	.125	.030
23	.0281	.050	.025	.109	.025
24	.0250	.050	.025	.109	.025

TABLE A. Projection welder: Dimensions—button type.

TABLE B. Projection welder: Dimensions—cone type.



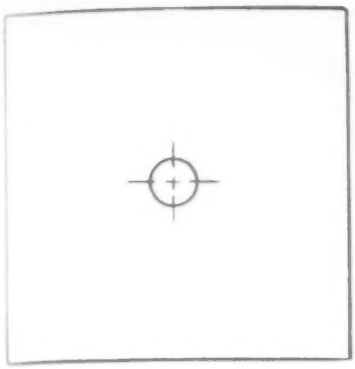
GAUGE	A	B	C	D	E
6	.2031	.070	.203	.094	.182
7	.1875	.070	.203	.094	.166
8	.1718	.060	.190	.080	.138
9	.1562	.060	.172	.080	.122
10	.1406	.060	.172	.080	.110
11	.1250	.055	.172	.080	.100
12	.1093	.055	.172	.080	.090

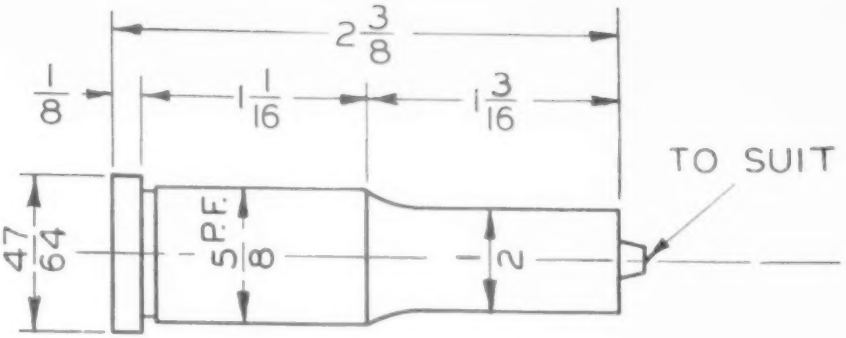
IN ABOUT 50 PER CENT of the cases where projection welded sheet metal assemblies fail or are unsatisfactory, the foreman blames the designer or diemaker for improperly designed or faulty shaped projections in the individual parts. The correct shape of welding embosses is a topic that has been long discussed, but even in the largest plants much experimenting is still done. Trouble usually starts in the design of the parts themselves.

Most product engineers do not have a set of tables or other method to guide them in correctly designing welding embosses. Therefore, they must depend entirely upon their experience or the experience of others. It is a common sight to see welding projections embossed on sheet metal parts of the same thickness and used in similar applications that are as different as day and night in size and shape. Like all other things there is a way to design these projections that constitutes the best practice.

If designers persist in varying the design for similar applications it is certain that the best practice is not followed all of the time. Besides failing to proportion welding projections according to proven practice, the product designer in nearly all cases fails to dimension the depression on the drawing that is necessary to produce the projection. This is because he is not familiar with press operations and has no idea what shape depression is necessary, not to mention actual sizes.

The usual way he gets around this is to show some kind of a depression and place a note on the drawing "to suit," as shown in Figure 1. "To suit" in





Above—**FIGURE 2.**

Below—**FIGURE 3.**

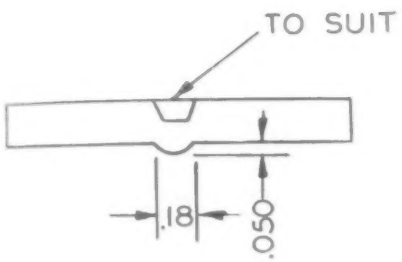
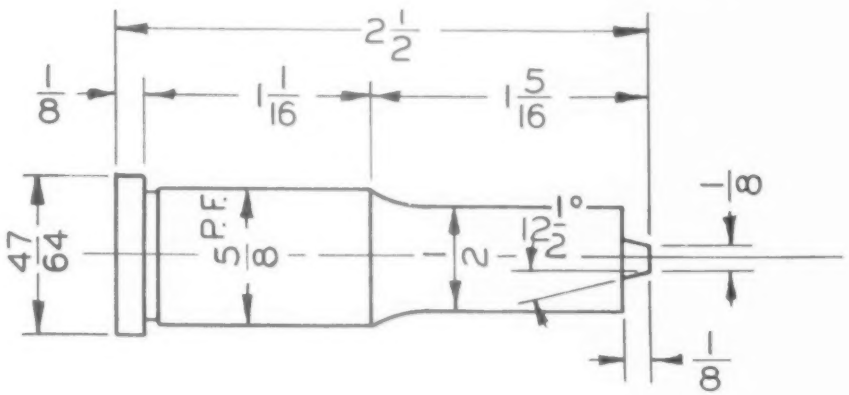


FIGURE 1.



cases of this type is merely a means of passing the responsibility onto someone else. The die designer has no idea what shape is necessary, so in detailing the embossing punch he also marks the detail drawing "to suit," as shown in figure 2. The diemaker also has no idea of the shape required, but being the last one down the line, he cannot pass the "to suit" further. He must make a trial guess. Put into steel, trials of this type are expensive.

It is not uncommon for a diemaker to make four to six punches before a satisfactory shape is found. It is not only the cost of making the punches, but the cost of repeated trials in the press, that makes this procedure expensive — not to mention delay.

After a punch has been developed that produces a welding projection embossed to part print specifications, it is often necessary to repeat the whole process a number of times because the part print sizes will not work in actual welding practice. How can this practice be stopped? First, product designers dealing with sheet metal

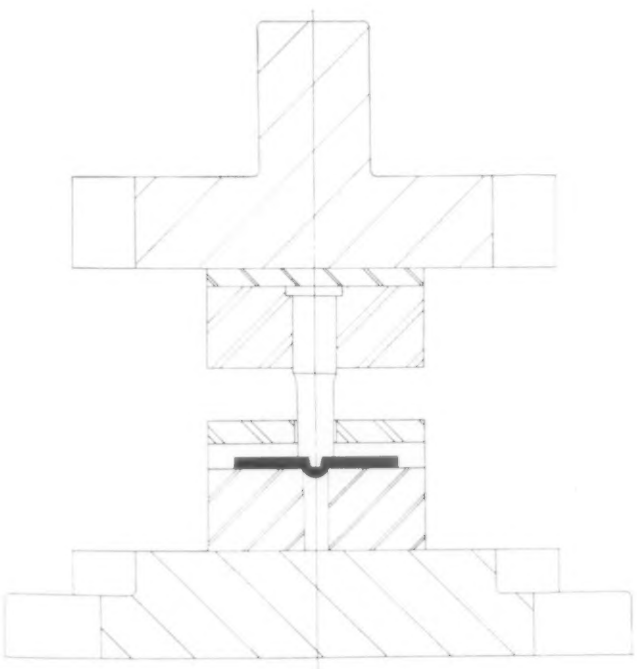


FIGURE 4.

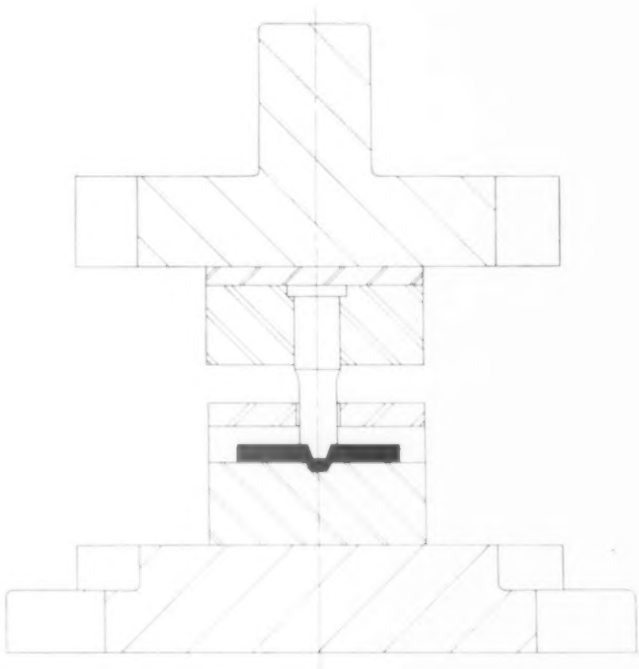


FIGURE 5.

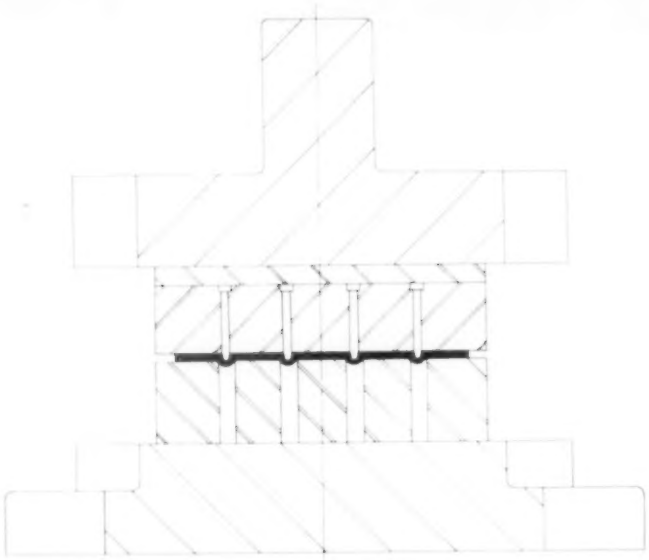


FIGURE 6.

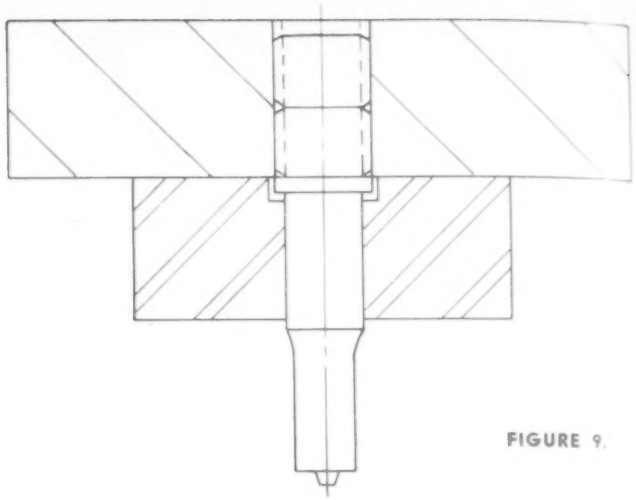
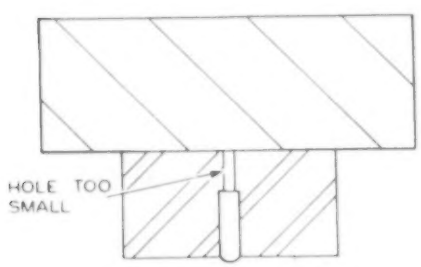


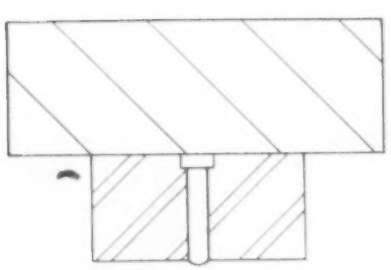
FIGURE 9.

assemblies that are to be projection welded should be furnished with tables showing and completely dimensioning for different metal thicknesses, welding projections that have proven correct in practice.

In Table A the button type is illustrated. It is satisfactory for stock up to 13 Ga. as indicated in the table. In Table B the cone type is illustrated. This type is used on thicknesses over 13 Ga. Too often designers specify the button type in these greater thicknesses, many of whom have never even heard of the cone type. The cone type has proved of great value in the heavier gages.



Wrong.
FIGURE 7.



Right.
FIGURE 8.

Both tables show complete dimensions not only for the emboss itself but also for the depression. These dimensions enable the die designer to completely dimension the detail drawings of the embossing punches as in figure 3. The diemakers only find it necessary to make the punches. If the workmanship is satisfactory there will be no need for trials and changes. Therefore, if the product designer will use these tables, he not only assures himself that the welding projections are correct in design and size, but is also furnishing complete instructions to the die designer.

Delay and experiment eliminated

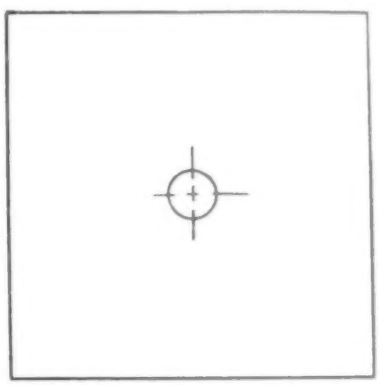
In standardizing these embosses, the product designer's job will not only be simpler, delay and expensive experimenting in the toolroom be eliminated, but other advantages will be gained. In finding the depression shape by trial, the diemaker usually has one idea in mind; this is to produce a depression that will cause a projection to be embossed to part print specifications.

His final result, although it may accomplish this, may have three serious faults:

First, the depression may be of such a type that a delicate, weak punch is necessary to accomplish the work. This adds to greater die upkeep.

Second, embosses may be produced that are correct in size and form but the depression used to make them leaves them weak and nearly ready to fall out of the blank. I have observed stampings where several embosses have fallen out before the operator could get the assembly into the welding machine. On other occasions the embosses are pushed back into the depressions because they are too weak to resist the pressure applied in welding until they can melt into the mating stamping. Very serious results can come from this practice. It is not always possible to inspect welded assemblies 100 percent. Consequently they may even be put into use before they fail, which condition is always more serious than momentary failure in the shop.

Third, faulty depressions may cause



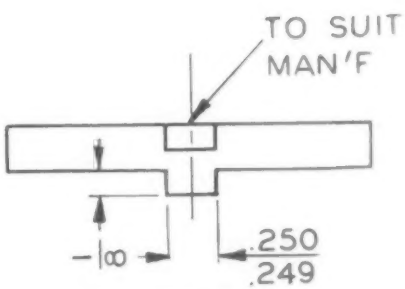


FIGURE 10.

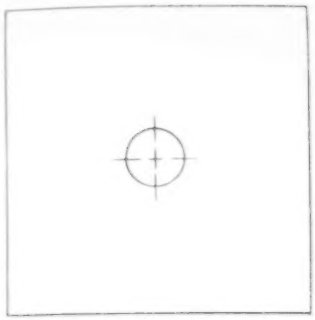
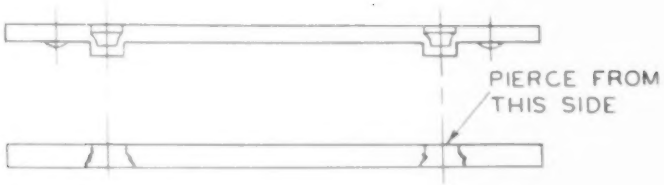


FIGURE 13.



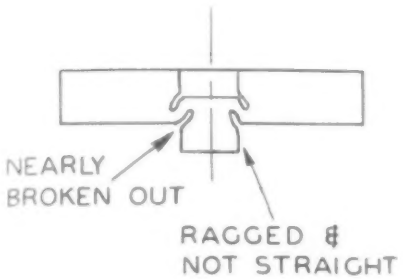
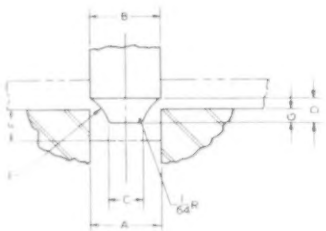


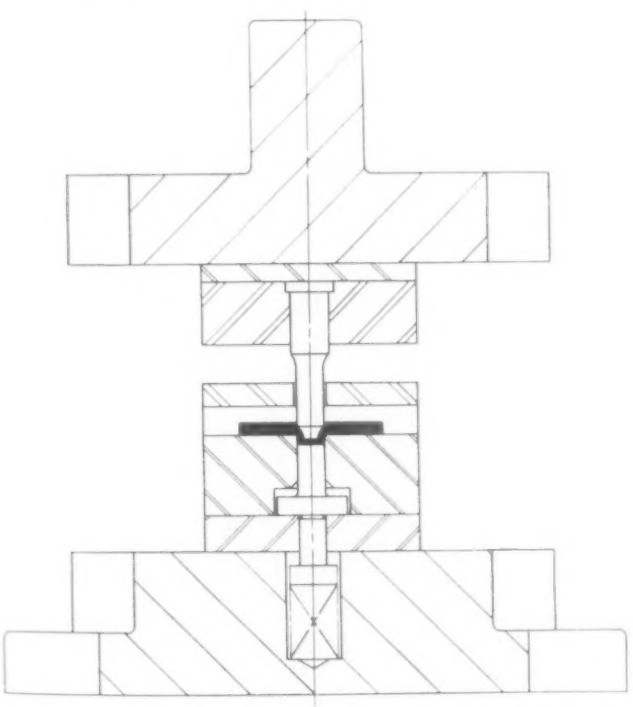
FIGURE 11.

an increase in pressure required to produce them. While this may be negligible with a single projection, when produced in groups, which is usually the case, the increase may be appreciable. Embossing is a type of coining operation. If the depression is not correctly designed the coining action will not be held to a minimum. As is well known, ordinary presses are not capable of much coining and carelessness in mistaking coining for plain forming may overload the press selected for the job.

When the depressions are dimensioned on the drawings the die designer simply designs the end of his punches to conform with them. He must, however, design the remainder of the punch properly or the operation may be subject to failure. The die must also be properly designed to produce

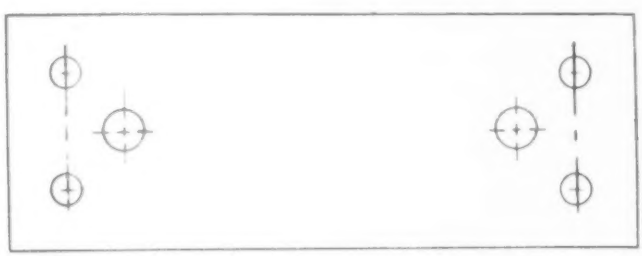


A = DIA OF HOLE IN DIE
B = 5 F IN A
C = 1/2 OF B
D = THICKNESS OF STOCK
E = 1/2 B
F = HEIGHT OF BUTTON
G = 1/4 OF F



Punch and die proportions for extruding locating buttons.

FIGURE 12.



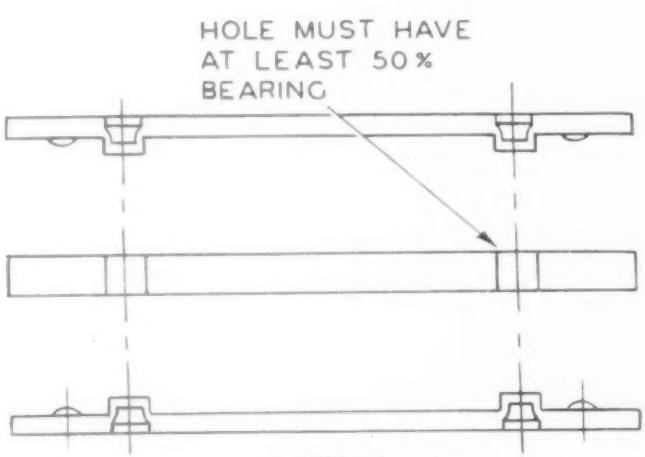


FIGURE 14.

a good job as cheaply as possible.

Good examples of punch and die design are shown in Figures 4 and 5. The former shows the correct design for button type projections and the latter correct design for cone type projections. Note in Figure 4 that only a straight die hole is required. The punch is so designed that the rounded emboss will be automatically produced without actual force in a female cavity. This produces the emboss naturally and tends to reduce pressure to a minimum and permit a low cost die. Some designers (because their depressions are incorrect) use separate die buttons machined to conform to the shape of the emboss. This not only necessitates coining the metal by force to fill out in the button but is an expensive design.

In Figure 5, cone type, a form fitting button or die is necessary for each projection due to the shape of the emboss. Coining is held to a minimum by a scientifically designed depression which is designed to distribute the metal without packing.

These cross sections show only general principles and a single application. Other type punches can be used depending upon whether the die making the embosses is of the compound, progressive, or simply a plain embossing die. A satisfactory way of producing a number of embosses in a blank where there is danger of throwing the part out of flat is shown in Figure 6. Here the punches are shown protruding through a hardened plate which serves to correct any distortion by striking the work at the end of the stroke.

In the design of an embossing punch provision must be made for its easy removal. The coining action soon buries the punch tightly in its hole. If a large knockout hole is not provided, it will be found impossible to remove it. Figures 7 and 8 show wrong and right design. Adjustable punches are sometimes required to maintain identical height for all embosses (this is important in projection welding). A good method for providing this adjustment is shown in Figure 9.

LOCATING BUTTONS

SOME FORM of positive location is necessary in order to accurately locate the various parts comprising an assembly in relation to each other. Special plates, nests, or even elaborate locating jigs are used very commonly for this purpose. Most of this special equipment can be disposed with by using locating buttons instead. More positive location is effected and a greater saving in tooling is made. This is another responsibility of the product designer to make provision for locating the parts before they are welded.

In 90 percent of cases locating buttons can be incorporated in the part prints. If these provisions have not been made the die designer should confer with the engineering department about the possibility of adding them before he plans on any other locating method.

Locating buttons are old in principle but are used sparingly because the average die designer does not have the skill to properly design the punches and dies to produce satisfactory ones. Again the die designer is mislead by seeing the part print depict the button as shown in Figure 10. In the design of the die he treats it in the same manner as piercing a slug excepting the punch does not penetrate the whole stock thickness.

This method of producing locating buttons is unsatisfactory in that while the procedure looks good on the die drawing it does not work well in practice. After any punch has penetrated the stock a third or more the slug is fractured from the main body of the part. Rough handling will often shake the buttons free of the stamping before the operator gets a chance to assemble it to its mating part. Moreover, the usual clearance applied causes the slug to be tapered and not to size for its full height as can be seen in Figure 11. These have been main reasons for the limited use of buttons.

When buttons are properly made, however, they always offer the best and cheapest solution to locating problems. In Figure 12 is shown a sectional view of an extruding punch and die. All the necessary details are shown in order to enable the designer to apply the principle to any die. Note that the knockout bottoms in order to keep the top of the button flat and cause the metal to fill out in a confined space for accuracy of diameter. A hardened backing plate is provided to prevent the punch from sinking into the punch holder, which would cause inaccuracies in the button.

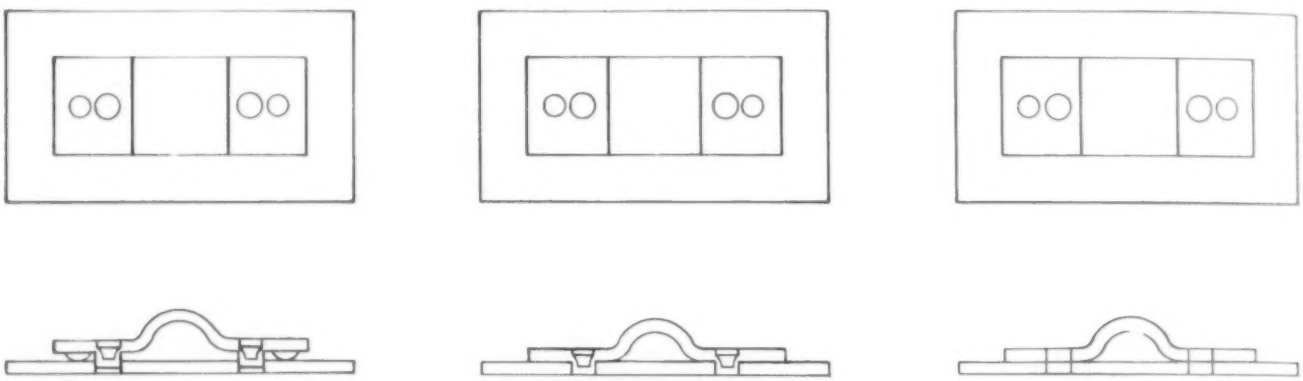


FIGURE 15.

Piercing location holes

Care should be taken in the direction or side from which the locating button holes are pierced. The button must enter the "good side" of the hole, or the side from which the work was pierced. If this precaution is not taken and the button enters from the breakout side, it will not be a good fit due to the taper in the hole caused by the clearance between the piercing punch and die as shown in Figure 13. In event the same hole is used to locate parts from both sides, Figure 14, the clearance should be reduced about

-half of that normally used to pro- a comparatively straight hole.

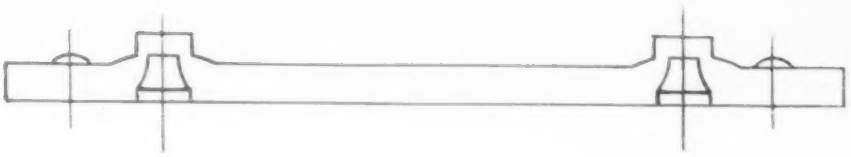
In cases where small parts are weld- to larger ones and there is no space locating buttons, a very satisfac- arrangement is shown in Figure The buttons are extruded within area of the holes. After locating welding, the holes are pierced rough the two thicknesses.

Avoid bulges around holes

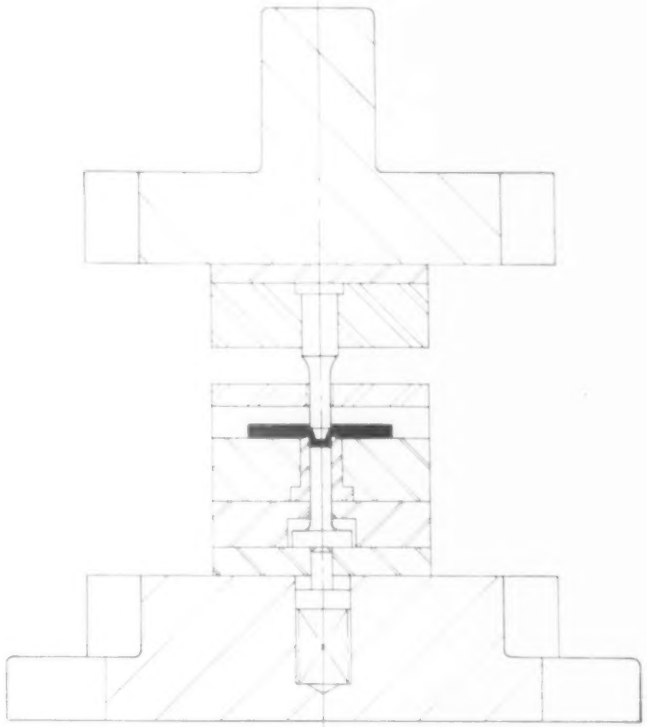
In producing locating buttons in ery heavy stock or of unusual height, slight bulge is sometimes produced around the button, Figure 16. This is caused by the complete change of grain structure of the metal in the extruding operation. It is detrimental to good welding because it prevents perfect contact between the two parts to be welded together. These bulges can be easily avoided by providing a die button in the die with a convex top slightly protruding above the surface of the die, Figure 17. Buttons may be extruded in height equal to the stock thickness.

Locating buttons, while designed expressly for that purpose, can be used for other purposes in sheet metal applications. They can be used in various forms as stops to limit the movement of other parts, as means to space pieces a fixed distance apart, etc. Using the design shown in this article the product designer can depend upon sufficient strength and will be assured that the button will not fall out in service.

THE END

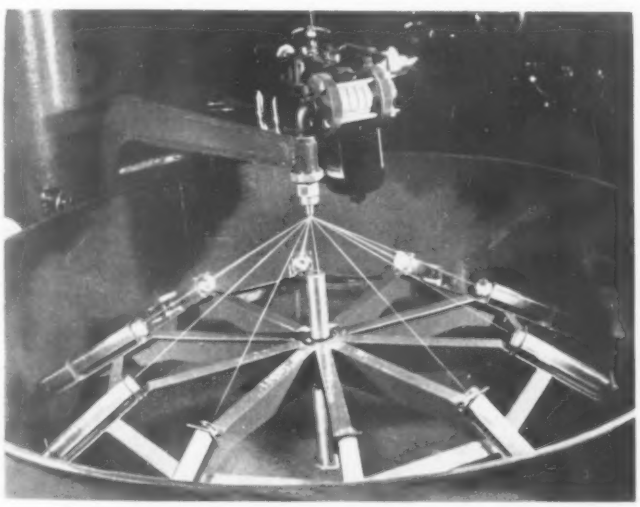


Above:
FIGURE 16.



Right:
FIGURE 17.

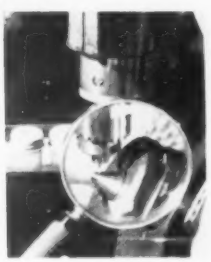
PRECISION DRILLING AND TESTING .008-INCH HOLES

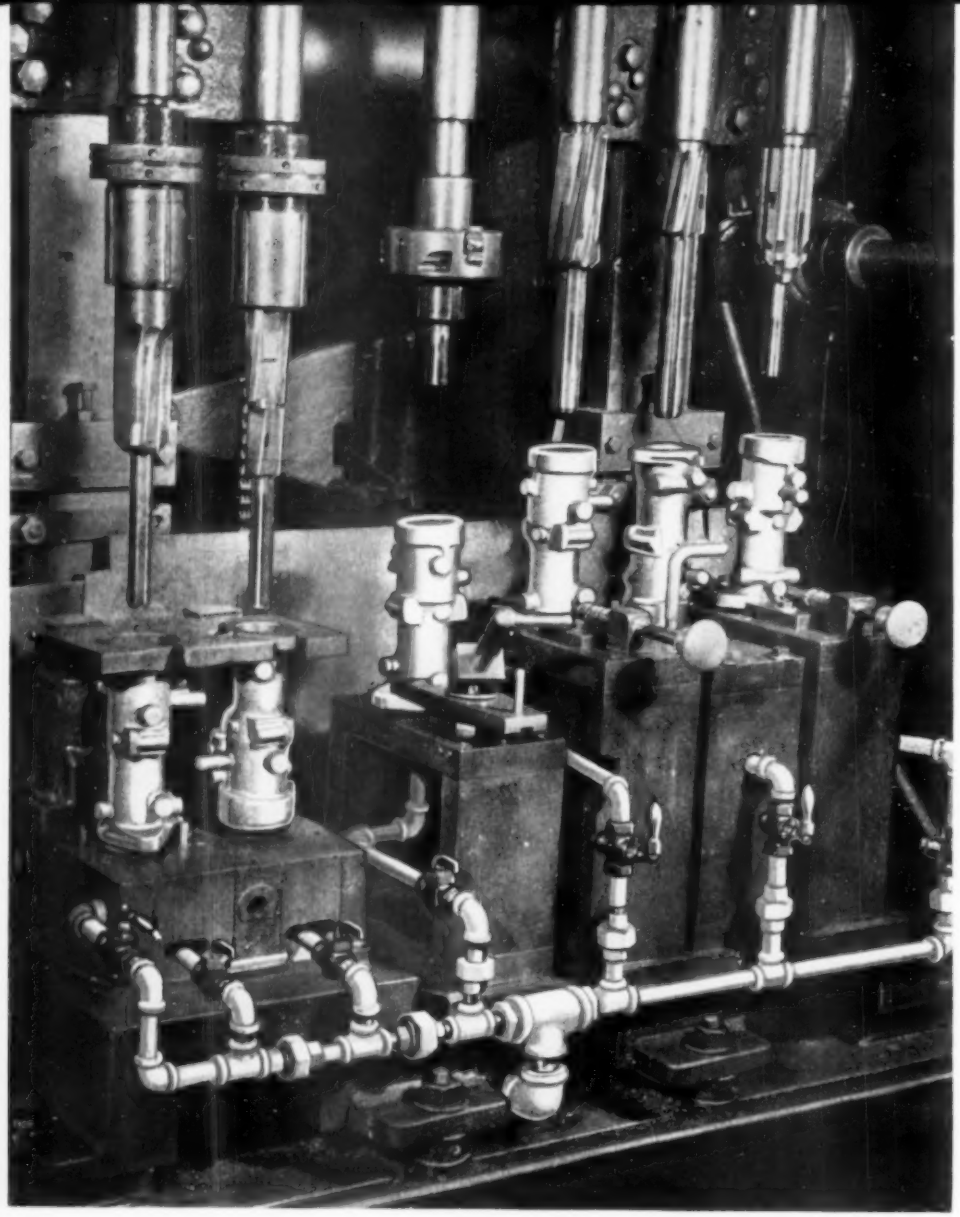


• A DIESEL ENGINE injection spray nozzle is smaller than a little finger tip. Fuel oil injection demands high accuracy in drilling the holes. At the Cooper-Bessemer Corporation Diesel plant, correct angles and .008-inch inside diameters are drilled with the jig shown here. The operator watches tool performance through a magnifying glass. In testing, fuel oil is forced through the nozzle under tremendous pressure into test tubes some inches away. Each stream of oil must strike the mouth of its particular test tube receiver accurately and deliver the proper amount of oil in a specified time. Nozzles employ a ring of from six to 10 holes. Uniform injection is requisite to peak engine efficiency.

Overhanging arm, at left, holds injection spray nozzle for test.

Operator watches tool performance through magnifying glass while drilling holes .008-inch in spray nozzle.





New fixture controls accuracy of work on worn Hole-Hog Machine. Pipes supply coolant through bottom of casting to points of the cutting tools.

New Methods of Machining Materials

M. MALLORY
MALLORY ELECTRIC CORPORATION,
DETROIT, MICHIGAN

CERTAIN new machining methods have been devised to eliminate some of the major difficulties arising in connection with boring, drilling and tapping. For example these methods prevent cuttings from remaining in and around the cutting tool edges, where they tend to build up on the cutting edges, causing scoring and gouging.

Another difficulty which has been overcome concerned the fact that such tools as drills and spiral cutters act as a centrifugal pump to throw out the chips and cuttings. If the oil or coolant is flowed in at the same point the tool enters the part being machined, the oil will be thrown out before reaching the end of the cutting tool, especially if a long hole is to be machined. The end of the tool becomes dry, overheats and causes scoring or gouging. This condition which also shortens the life of the tool, has been eliminated.

A further difficulty is that it is practically impossible to machine concentric holes on a drill press or a boring machine unless the machine is very heavy and all the bearings are in perfect condition. The slightest amount of play in the shaft that drives the drill or boring tool will drill or bore an eccentric hole, because the piece that is being machined must be locked in place and cannot float freely with the boring tool. If there is the slightest amount of springing between the base of a drill press on which the work is anchored and the shaft that drives the boring tool, the pressure applied to advance the boring tool will throw the boring tool out of alignment with the piece, causing the hole to be oversize or eccentric.

Solving the problem

Figures 1, 2, 3 and 4 illustrate the new methods which have solved these machining problems.

Referring to Figure 1, detail 1 is a pilot on the cutter, 2 is the cutter for the throttle bore, 3 is the cutter for the venturi outlet, 4 is a pilot fixed to and rotating with the cutter, 5 and 6 are reliefs for the oil and cuttings to pass through, 7 is the casting before any machining operation is done on it, 8 is a floating piece having provisions for the oil to pass through and for pilot 4 to enter, 9 is a line connected to the oil pressure pump. This line should be flexible for a short distance between nut 10 and the oil pump. On floating piece 8, 11 is a taper, 12 is a fin extending completely around floating piece 8, 13 is a plate which is anchored to the base plate of the drill press or boring machine, 14 and 15 are pieces anchored to plate 13. These pieces extend above fin 12 to prevent the floating piece 8 from being lifted when the work is being removed or the boring tool withdrawn. Floating piece 8 centers on a small piece marked 16, and 17 is the power drive shaft of the drill

press or boring machine.

The method for machining a carburetor barrel having a throttle bore and venturi is as follows:

Assume that casting 7 is direct from the foundry without any machine work being done on the bore. It has a taper in the bottom that locates on floating piece 8. The boring tool is lowered and pilot 4 will enter the inside bore of floating part 8 before the cutter makes contact. As soon as the cutter makes contact (The cutter should have a starting taper even though the bored hole is to be of one size as shown in Figure 3), the casting 7 immediately aligns itself. (Means should be provided to prevent casting 7 from turning.) The throttle bore and outlet of the venturi is completed at this operation.

It will be seen that the coolant or oil being forced through at high pressure will remove all chips and cuttings immediately as they are broken loose by the tool, preventing any scoring or gouging, as well as keeping the tool cool, and there will be an exceptionally smooth finish that can be held in close tolerance, making second finishing unnecessary in most cases.

After the first operation, the carburetor part 7 is placed in another fixture, shown in Figure 2, having a floating piece 8, but this floating piece has a pilot 18 machined on it to fit the throttle bore that was machined in the first operation. The throttle bore is used as a locator for the remaining places to be machined on the casting.

It can be seen that by this method the first bores will be concentric with the second bores. In other words, the venturi approach, the venturi outlet and the throttle bore will all be in alignment.

In Figure 3, the stationary piece 24 has a tapered bore which serves as a locator for casting 19. The shank of the cutting tool plays the role of the upper pilot; shown in Fig. 1. The cylinder or casting 19 can be bored having one size all the way through. However, if desired to have the lower hole in the casting smaller than the upper hole, the casting can be turned over and put on another fixture having a pilot that fits the first bore made. The fixture in Figure 3 is slightly different than shown in Figures 1 and 2. The casting 20 floats with the piece to be machined. Brackets 21 prevent the fixture from turning or moving upwardly when the tool is being withdrawn or the work removed. There should be clearance around the extensions 22 on brackets 21 to permit the fixture to float. The inserts 16 in Figures 1, 2, 3 and 4 should be hardened and should always be in alignment so that pilot 4 does not bind when entering the bore in the floating part 8. Lock 23 shows means for holding the piece to be machined from turning and following the tool when the tool is withdrawn. The piece to be machined should not be held tightly by lock 23 because the piece must be free to align itself.

It is important that a sufficient amount of oil pressure be used to act as a coolant and force out the cuttings. If the oil pressure is too low, the heavy cuttings will not be forced out. It is also necessary that there is enough clearance in the pilot and

FIGURE 1.

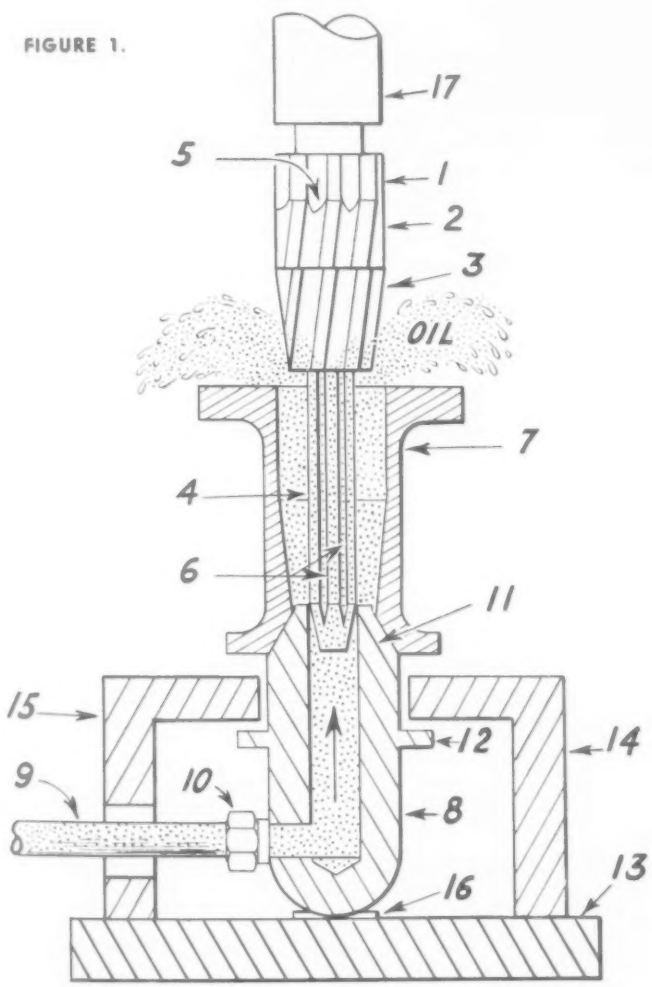


FIGURE 2.

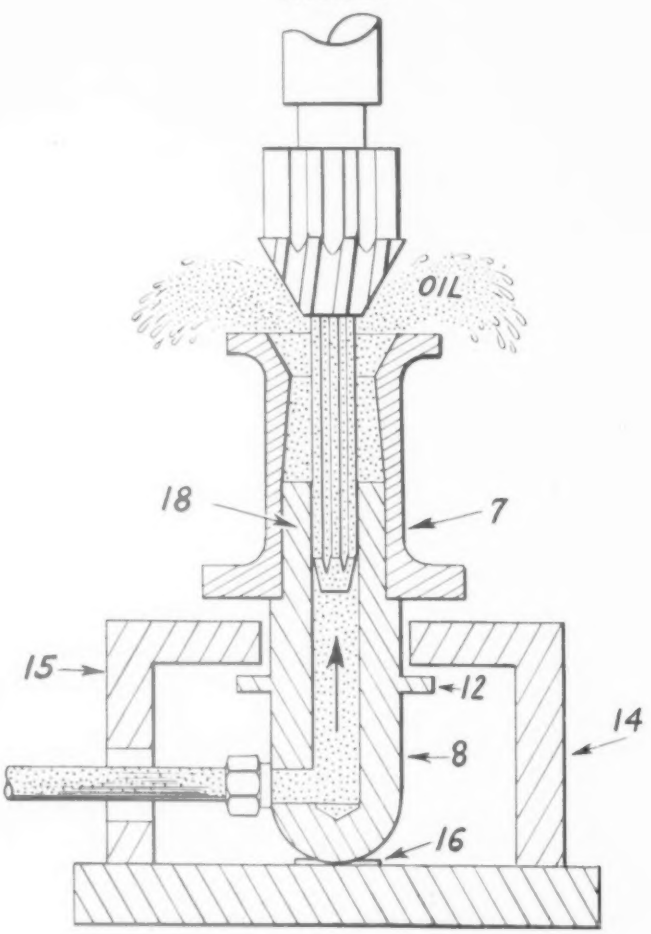


FIGURE 3.

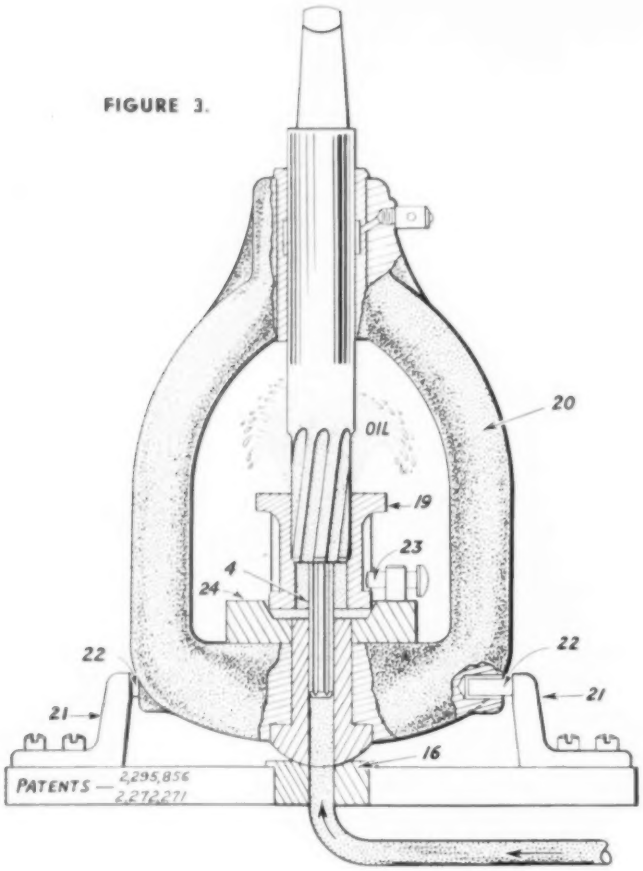
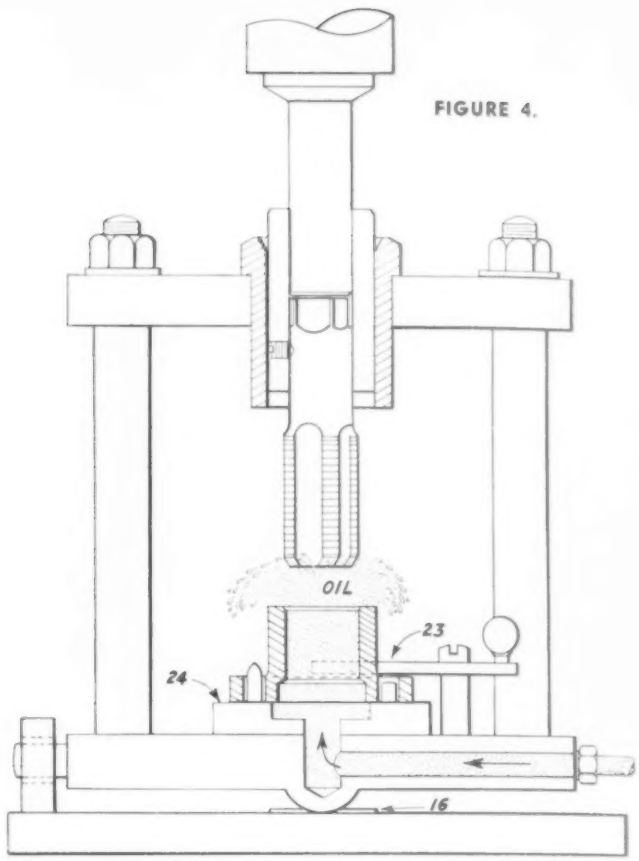


FIGURE 4.



cutters to permit the oil and chips to flow out. It will also be necessary to baffle or shield the oil by some means to prevent excessive splashing. A shield can be placed around the work. In Figure 3, a sheet metal plate could be affixed to the back of casting 5 and a sheet metal door hinged to the front of casting 5. The door could be opened to insert the work and remove it and be closed when the operation was taking place. A mixture of sulphur and kerosene is a satisfactory coolant for machining cast iron.

In Figure 4, a method is shown for tapping. Very clean and accurate threads can be made with this method because the chips are completely washed out of the work as soon as they are removed from the part. If desired, a pilot could be used on the tap shown in Figure 4 and a perfect tapping job could be done.

With these new methods of machining materials, only a small amount of stock is left to be removed, even though a second operation such as broaching or grinding is desired.

These new methods of machining make possible the use of worn boring machines or drill presses, because the fixture itself controls the accuracy of the work, and the drill press or boring machine acts primarily as the source of power. These methods have been tried and proven for a good many years by the Mallory Electric Corporation.*

The photograph shows an old Moline Hole-Hog machine, which is badly worn, doing accurate work with these new methods. It is also felt that equal advantages are gained in using this system on the latest equipment designed for machining preformed holes, because it provides means for the coolant to pass through while the machining is being done. Of course, if the part to be machined does not have a hole cast in it, a hole can be bored for the oil to pass through. If extremely accurate work is required the hole must be large enough for the pilot 4 to pass through and enter into the floating part 8.

The principal advantages of the methods outlined above are the coolant system and the elimination of locking the parts to be machined in place. The latter greatly speeds up production. The system is useful for machining large bores, such as engine cylinders, hydraulic cylinders, as well as machining small holes.

THE END.

NEW METHODS MUST CONTRIBUTE IN MANY WAYS TODAY

•

Times past, mass production engineers frequently devised methods which improved production, saved buying new equipment or conserved material. But they were often justified in sacrificing any of these factors, to satisfy one prime need such as more speed or lower machining cost. Today, new methods must satisfy many needs. Little can be sacrificed.

THE TOOL ENGINEER HELPS

•Particular emphasis now is on salvaging old machines, increasing machine efficiency, to which this article contributes. Equally important is material conservation, the subject of a feature beginning on page 103.

*The above methods of machining are protected by United States Patents No. 2,272,271 and No. 2,295,856. However, machine builders, manufacturers or machine shops will be given a free license to use these methods for making war materials for the duration provided they make a written request to the Mallory Electric Corporation for a license.

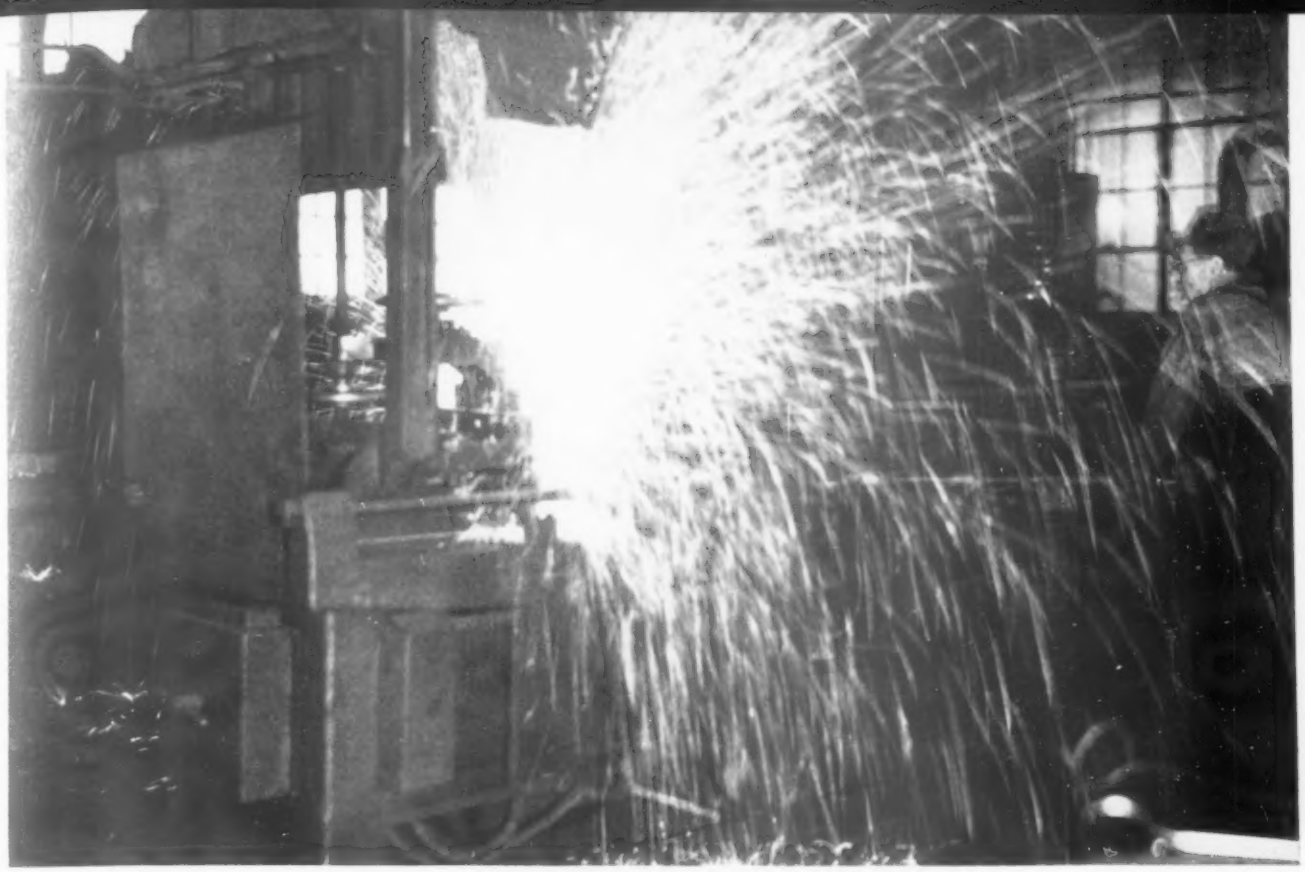


Figure 1. The shank and tip of welded composite steel tools are welded together in a butt welder of special design.

Welded Composite Steel Tools

A. M. GRUNER

VICE PRESIDENT
GENESEE TOOL COMPANY

ALTHOUGH hailed largely as a means of conserving strategic tungsten, composite steel tools have more to recommend them than their present vital advantage.

Some years before the war, experiments were made on composite tools consisting largely of high speed steel tips, "cinch-welded" into recesses of mild steel shanks. At the time there was little trouble in connection with material shortages. The development was initiated mainly to provide a tool having high hardness at the cutting edge, and greater ductility at the mounting.

Early tools of this type (Figure 2) were applied mainly to forming work on screw machines and similar equipment usually requiring dove-tail type mountings. Their advantage was that the cutting edge could be made of high speed steel, while the dove-tail would be of semi-hard carbon steel, and therefore less susceptible to fracture of the dovetail corners, at the drilled and tapped holes, etc.

In making such tools, the blank and shank were machined and the shank was recessed. The actual cinch-weld was accomplished during the hardening operation, the process being somewhat similar in character to a braze.

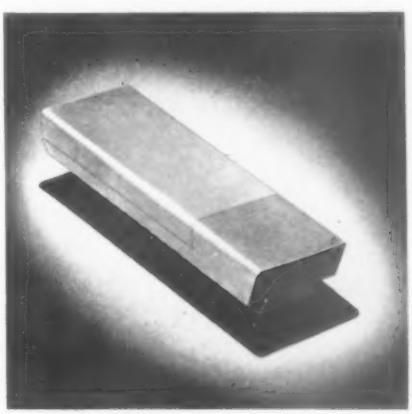


Figure 2. Early welded composite steel tools were used mainly in forming work on such equipment as screw machines, usually requiring dove-tail type mountings.

When the tool came out of heat-treat, the shank remained moderately hard, while the tip was in the hardness range of 63-66 Rockwell. Grinding was the last operation on the tool. The process proved quite successful after initial difficulties were overcome, and by 1938 a considerable number of "Tomahawk" tools of this type were in regular use.

The process was little publicized at the time. It was not until after U. S. supplies of tungsten were pretty well cut off that it was suddenly "discovered." Since then, many such tools have been produced, employing both the 18-4-1 series and molybdenum types of high speed steel tips.

Some years ago development was initiated on an improved method of producing composite steel tools, providing a stronger bond between the high speed steel and the soft steel shank. Eventually it was found that a satisfactory result could be secured by employing resistance butt welding.

In production, blanks of soft steel

are rough cut to size from bar stock. The high speed steel blanks are forged to approximate size. Next, the parts are annealed, faces are ground to insure positive contact, and the parts are pre-heated prior to welding.

Thickness of the HSS blank depends of course on the depth of the "form" to be machined into the tool and on re-sharpening considerations, while the thickness of the shank is determined roughly by the type of and size of mounting to be used. Usually the general proportion is about ⅓ high speed to ⅔ soft steel (usually S.A.E. 1040). The two pieces are welded together in a butt welder of special design (Figure 1).

The various steps are shown in Figure 3. At left are the two blanks, the upper being of high speed steel. In the center of the picture is the tool blank after butt-welding. A finished tool machined from such a blank is shown at the right.

The practice of butt-welding of soft steel shanks to hard steel cutting tools is of course not new. Numerous tools having a long taper shank have been produced in this manner for a considerable number of years. The purpose, in addition to securing greater ductility for the long shank, was to reduce the amount of scrap and production time, since less machining was required when the tool was fabricated from two pieces.

Since composite steel die-sections had been produced by welding for some time, the actual welding operation presented few technical difficulties, and it has been found possible to control the welding in such a manner that the composite steel tool takes the same heat-treatment as that recommended for the high speed steel of which the blank is made.

At the outset, a considerable number of steel varieties were employed for the blanks. As the use of tungsten became more and more critical, however, an increasingly greater proportion of such tools have been produced from molybdenum high speed steels, containing less than 6 per cent of tungsten. This steel is of a type lending itself well to heat-treating in furnaces used formerly for 18-4-1 steels.

As to heat-treating equipment, experience shows that the time required to harden the low-tungsten molybdenum steel increases with the percentage of CO in the furnace atmosphere,

CHARACTERISTIC HARDENING AND DRAWING DATA FOR LOW-TUNGSTEN MOLYBDENUM

HARDENING DATA

HARDENING TEMPERATURE	FRACTURE	ROCKWELL C AS-QUENCHED	ROCKWELL C AFTER 1025° F.—2 HRS.
2150°F.	VERY FINE	65.0 — 66.0	66.0
2200	FINE	65.0 — 66.0	66.0
2250	FINE	64.0 — 65.0	66.5
2300	SLIGHTLY COARSE	63.0 — 64.0	67.0

OXIDIZING ATMOSPHERE IN FURNACE

TEMPERATURE	TIME	ROCKWELL C AS-QUENCHED	ROCKWELL C TEMPERED AT 1025°F.
2200°F.	4 TO 8 MINUTES	65.0	65.0 — 66.0
2225	4 TO 8 MINUTES	65.0	65.0 — 66.5
2250	3 TO 6 MINUTES	64.6	65.5 — 67.0
2275	2 TO 4 MINUTES	64.5	66.0 — 67.5
2300	2 TO 3 MINUTES	64.0	66.0 — 67.5

DRAWING DATA

This table shows two typical tempering series. One is based on hardening in the lower range, 2225° F., and the other on the higher range of 2275° F. One inch rd. hot rolled bars were turned to ⅞" rd. and specimens cut 3" long. Preheat temperature was 1500° F. (for 20 minutes), and the samples were hardened in a muffle type furnace having an atmosphere of 11% CO. All pieces were oil quenched. The time at 2225° F. was 5½ minutes, and at 2275° F., 5 minutes. Fractures were fine at both temperatures. Tempering time was 2 hours.

DRAWING TEMP.	2225° F. SERIES	2275° F. SERIES	DRAWING TEMP.	2225° F. SERIES	2275° F. SERIES
0	64.0—65.5	63.5—65.0	1050	64.0—65.5	65.0—66.5
400°F.	62.5—63.5	62.5—63.5	1075	63.5—64.5	64.5—65.5
500	62.0—63.0	62.0—63.0	1100	63.0—64.0	63.5—65.0
600	61.0—62.0	60.5—61.5	1150	61.0—62.0	61.0—62.5
700	60.5—61.5	60.5—61.5	1200	57.0—58.0	57.0—58.0
800	61.0—62.0	61.0—62.0	1300	46.0—47.0	46.0—48.0
900	63.5—64.5	63.5—64.5	1400	36.0—37.0	37.0—39.0
1000	65.0—66.5	66.0—67.0	1500	31.0—33.0	31.0—33.0
1025	65.0—66.5	66.0—67.5			

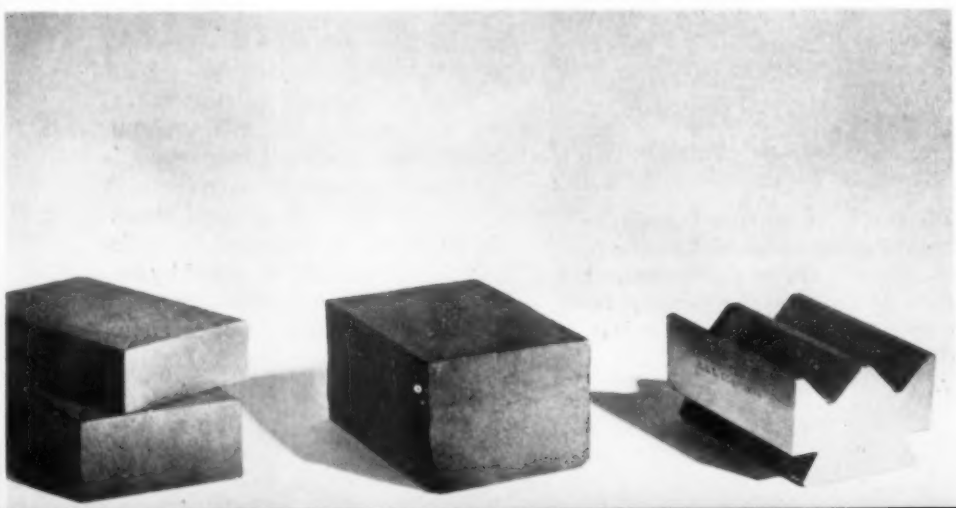


Figure 3. Steps in the production of composite tools. Top block at left is high speed steel. In the center is the tool blank after butt-welding. A finished tool machined from the blank is at the right.

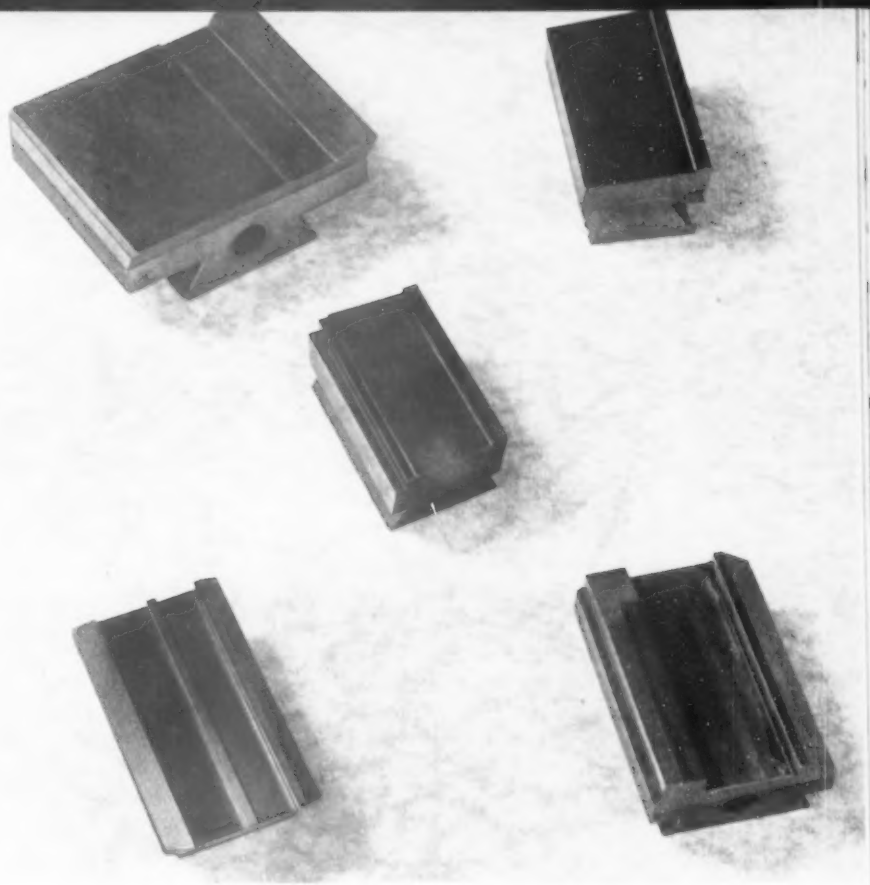


Figure 4. Here is a typical group of forming tools made by the welded composite method described in this article.

thus reacting much like 18-4-1 steel. Hardening temperatures range from 2150° to 2300° F., the former producing a very fine grain structure, while the latter is slightly coarse. Rockwell tools hardened at around 2150° ranges around 65.0 to 66.0 on the "C" scale, as quenched, and around 66.0 after drawing at 1025° for two hours.

When hardened at the higher temperature, Rockwell hardness is about two points less, but is around 67.0 after drawing for two hours at 1025°.

In addition to the greater ductility and inherently higher strength of the dovetail shank, particularly at the corners, there is the added advantage of greater ease of drilling and tapping holes for attaching the tool to the fixture. THE END

CHARACTERISTIC HARDENING AND DRAWING DATA FOR 18—4—1

HARDENING DATA

Test pieces 1" sq. were machined on two flat surfaces to remove decarbonization and cut 3" long. They were then hardened by preheating to 1600°—1650° and brought up to series of temperatures listed below and quenched in oil. Hardness results as follows:

TEMPERATURE	ROCKWELL C	BRINELL	SHORE	FRACTURE
1800°F.	53-54	512	73-75	SLIGHTLY COARSE
1900	57-58	555	77-79	SLIGHTLY COARSE
2000	58-60	600	81-82	SLIGHTLY COARSE
2100	61-62	640	82-83	SLIGHTLY COARSE
2200	63-64	652	84-85	FAIRLY REFINED
2250	64-65	683	85-86	REFINED
2300	65-66	713	85-86	REFINED
2350	65-66	713	85-86	REFINED
2400	65-66	713	85-86	SLIGHTLY COARSE

DRAWING DATA

Test piece similar to above hardened same way and drawn in electric furnace one hour at temperature.

HARD'G TEMP.	HARDNESS ROCKWELL C									
	AS QUENCH'D	DRAW 300	600	800	900	1000	1100	1200	1300	1400
2000	58-60	58-59	57-58	56-57	56-57	56-57	55-56	53-54	45-48	32-35
2100	61-62	61-62	58-59	58-59	58-59	58-59	57-58	54-55	47-49	32-35
2200	63-64	62-63	60-61	60-61	60-61	61-62	60-62	57-58	49-50	32-35
2300	65-66	63-64	60-62	60-62	61-62	62-63	63-64	60-61	52-53	32-35
2350	65-66	63-64	62-63	62-63	62-63	63-64	64-65	60-62	52-53	32-35

Conserve Your Welding Rod

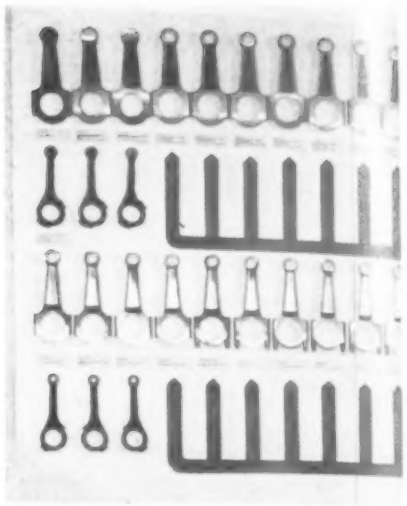
Good tool and machine operators do not waste materials, but intensive cultivation of this habit of conservation is more commendable today than ever.

The tremendous increase in welding application has made welding rod an essential material. Some plants, in an effort to conserve rod, have devised a control plan in which the operator receives a specified number of rods in a box. That number of stubs must be returned when the operator requires more rods, and stubs must be no longer than two and one-half inches. A slot in the top of the box is used for discarding stubs, serving to impress the operator with using all the rod of practicable length.

The Linde Air Products Company has suggested a further step in welding rod conservation whereby stubs can be tack-welded to a new rod at the moment of use, or saved and welded together into a single rod.

Whatever method is used, any welder will readily appreciate the amount of rod which a constructive salvage program will save.

Connecting Rods as a WAR Product



American engineers set new standards of tolerance in mass production machining operations on war products. Airplane engine parts are machined to one-sixth the weight of similar automobile parts.

R. E. DAVIS and W. A. SCOTTEN

WAR has set standards of quality and tolerance in mass production never demanded in peacetime manufacture. Numerous war products now turned out in quantity by American industry were originally designed and built to job-shop standards and job-shop tolerances. Their production on an assembly line basis conceivably did not concern their original designers.

These products are subject to more severe stresses, strains and shocks than any peacetime product. They must be more accurately manufactured and more rigorously inspected. Upon these things depend the saving of human lives and the attainment of victories. In some respects, the job of producing such radically different products has been the equivalent of starting new business, with new products, new jigs, new fixtures, and new machine tools.

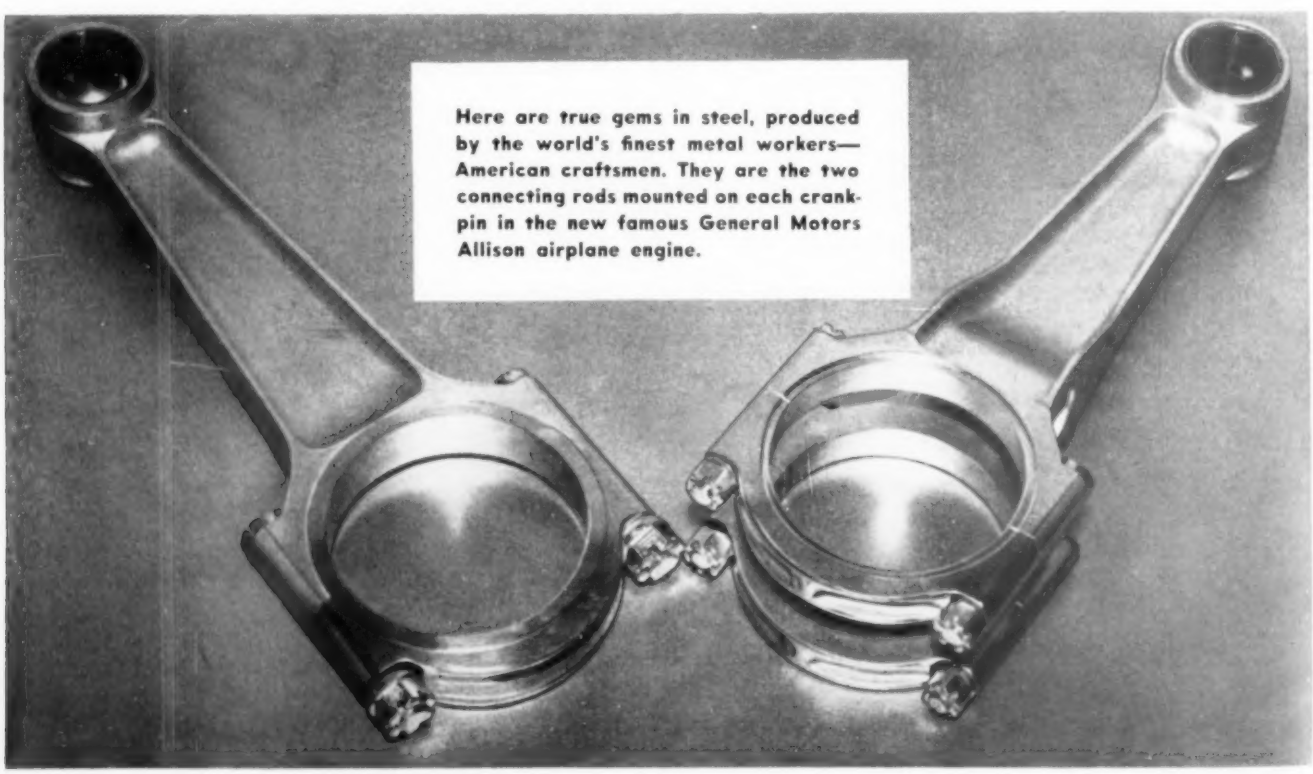
But these accomplishments have not been obtained by magic wand-waving. It has taken hard work and detail planning.

An example of such a war product is the alloy steel symmetrical crankshaft of General Motors' Allison engine, now in mass production in the automobile concern's plants. This connecting rod, which makes right or left hand rotation optional, is of the fork and blade type. Of one-section construction, it is machined and polished on all surfaces to arrive at the minimum weight that will handle a terrific load. It is heat treated (Rockwell hardness 32-36-C) to give it maximum strength and durability; it is polished to remove scratches that lead to cracks and eventual breakage. Then this single part of the highly intricate Allison engine is shot blasted to a compressed skin that increases its life.

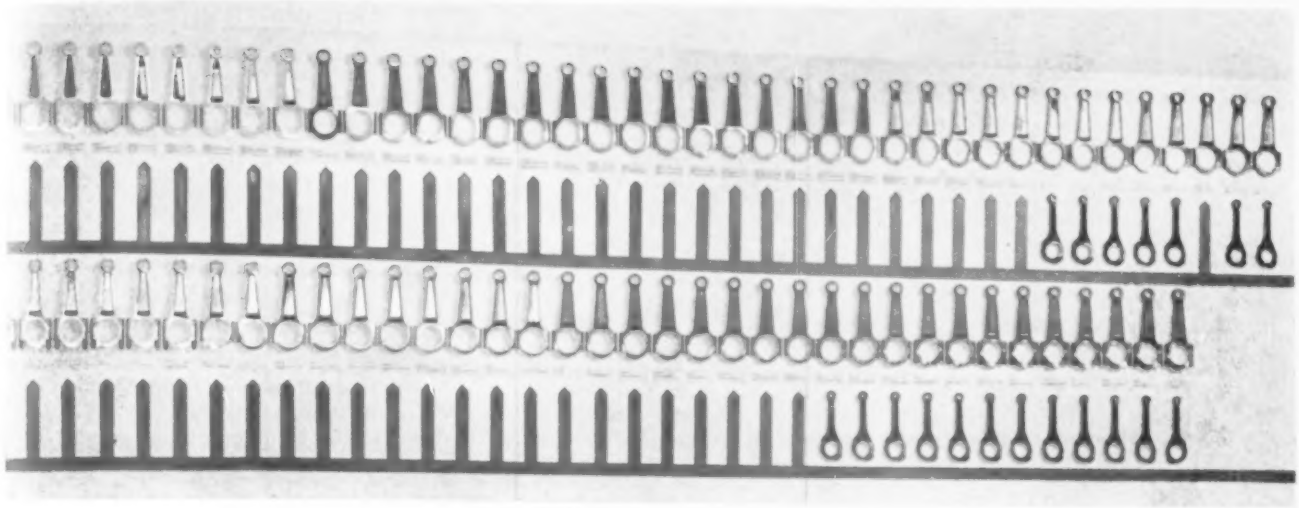
Two rods are mounted on each crankpin with a single split steel back bearing faced with lead bronze inside for the crankpin bearing and outside for the blade rod bearing.

Accompanying this article is an illustration comparing the machining steps necessary in producing the Allison engine connecting rod with those necessary in turning out a Cadillac connecting rod.

This 150-horsepower automobile



Here are true gems in steel, produced by the world's finest metal workers—American craftsmen. They are the two connecting rods mounted on each crankpin in the new famous General Motors Allison airplane engine.



engine, one of the finest built, weighs about six pounds per horsepower. This weight to horsepower is about average for all automobile engines. The Allison engine weighs less than one pound for each of its 1,325 horsepower. Actually, weight of this engine is only 1,303 pounds.

When in operation, the automobile piston and rod must support a load equal to the weight of one heavy automobile. The Allison piston and rod, when in operation, must support a load equal to the weight of five heavy automobiles.

More horsepower and less weight mean more machining work. This fact is graphically demonstrated in the accompanying illustration, which shows that there are 25 machining operations on the automobile rod, and 85, or almost four times as many, on the airplane engine rod.

Thus, while only 2-10th man hours were required in the finishing of one of the finest mass-produced automobile engine parts before the war, production engineers find it necessary to invest 11 man hours in the same part for a war product. Here is an increase of almost 55 times in production time for a similar part. The entire increase may be attributed only to the necessity of adhering to tolerances never before achieved in real mass production.

Obviously, the types and numbers of machines required for the Allison rod job are many times those required for the pre-war job. In fact, the pre-war automobile factory production set-up would scarcely begin to make the war plane engine part requiring an additional 60 complicated machining operations. THE END

Craftsmanship Par Excellence in 85 Machining Operations on one Airplane Engine Part

1. ROUGH FORGING.
2. ROUGH MILL crank & piston pin faces (one side).
3. DITTO (two sides).
4. ROUGH DRILL & REAM piston pin hole; ROUGH CORE DRILL crank pin hole.
5. ROUGH MILL edges of one section (both sides).
6. ROUGH HOLLOW MILL ends of piston pin boss (one side).
7. DITTO (two sides).
8. ROUGH FORM MILL bottom outline of cap.
9. ROUGH FORM MILL bolt boss radii (one side).
10. DITTO (two sides).
11. ROUGH MILL half of piston pin boss & flange face of one section (one side).
12. DITTO (two sides).
13. ROUGH MILL webb and inside of one section (one cut).
14. DITTO (one side completed).
15. DITTO (three cuts).
16. DITTO (two sides completed).
17. ROUGH PROFILE MILL stock left in small end of webb, form 3/8 radii (one side).
18. DITTO (two sides).
19. HEAT TREAT (Rockwell Hardness 32-36-c).
20. FINISH MILL faces of crank & piston pin bosses (one side).
21. DITTO (two sides).
22. ROUGH GRIND faces of crank pin and piston pin bosses (one side).
23. DITTO (two sides).
24. SEMI-FINISH REAM piston pin hole and SEMI-BORE crank holes.
25. BROACH locating spots.
26. FINISH MILL edges of one section (one side).
27. DITTO (two sides).
28. FINISH HOLLOW MILL end of piston pin boss.
29. FINISH FORM MILL bottom outline of cap.
30. FINISH MILL half of piston pin boss & flange face of one section (one side).
31. DITTO (two sides).
32. FINISH MILL webb and inside of one section (one cut).
33. FINISH MILL webb and inside of one section (one side complete).
34. DITTO (three cuts).
35. DITTO (both sides).
36. FINISH PROFILE MILL stock in small end of webb form 3/8 radii, (one side).
37. DITTO (both sides).
38. MILL top of bolt bosses & saw off cap (one cut).
39. DITTO (complete).
40. FINISH GRIND joint faces rod & cap.
41. FINISH MILL channel slots in bottom of cap.
42. DRILL & REAM bolt holes in rod.
43. DRILL & REAM bolt holes in rod and cap.
44. COUNTERSINK bolt holes in rod and cap; SPOT FACE cap & upper end of rod.
45. LAP J-faces of rods & caps.
46. ROUGH BORE bolt holes in rod & caps.
47. FINISH BORE bolt holes in rod & caps.
48. SEMI-FINISH LAP bolt holes.
49. ASSEMBLE rod & cap with bolts & nuts.
50. PRECISION BORE crank pin hole.
51. ROUGH TURN crank face diameter.
52. GRIND crank faces & piston pin faces.
53. GRIND edges of one section.
54. BROACH bolt boss radii.
55. GRIND crank boss faces.
56. GRIND angular portion of piston pin boss.
57. POLISH bolt boss & ISSUE shop number.
58. GRIND shoulder on rod.
59. GRIND nut seal shoulder on caps.
60. FINISH SPOT FACE bolt & nut seats in rod & cap.
61. POLISH bolt seat in cap.
62. GRIND flats on piston pin boss.
63. GRIND O.D. on piston pin boss.
64. DRILL oil hole in piston pin boss & CHAMFER.
65. 100% INSPECTION and Rockwell 32-36-c.
66. ROUGH POLISH.
67. FINISH POLISH and MAGNAFLUX.
68. SHOT BLAST rod only.
69. HAND LAP joint faces.
70. LAP bolt holes in rod.
71. LAP bolt holes in rod & cap.
72. FINISH COUNTERSINK bolt holes in rod & cap.
73. FINISH GRIND piston pin hole and INSPECT 100%.
74. FINAL ASSEMBLY.
75. FINISH GRIND crank thrust faces.
76. FINISH GRIND crank pin hole.
77. GRIND 1/64 by 45-degree chamfer edge of crank hole.
78. PRESS IN bronze bushing.
79. BURNISH bushing.
80. DRILL oil hole in bushing.
81. BACK COUNTERSINK 3/8" CHAMFER I.D. oil hole.
82. DIAMOND BORE bushing to size & CHAMFER edges.
83. HONE crank pin hole.
84. LAP thrust faces.
85. FINISHED ROD.

Ordnance Inspection Gages and Gaging

To give this country a sharpshooting army, Ordnance developed a superior gaging policy. To make the policy work, the gaging industry was expanded from $3,500,000 annual volume to $125,000,000 today.

COLONEL H. B. HAMBLETON
OFFICE OF CHIEF OF ORDNANCE

LAST WEEK one of the officers in my office came upon a report of the inspection examination and interchange of Springfield & Harpers Ferry Muskets made by Brevet Major P. V. Hagner at Harper's Ferry Armory, December, 1859. I would like to quote a few extracts from this report, "The parts of two Harpers Ferry guns and three Springfield guns intermixed and reassembled; results, inter-changeability perfect", however, the report goes on to state, "In attempting to imitate the bad work on the patch box, they have had great trouble and expense at Springfield. It is essential that new gages be made."

From this it may be noted that as far back as before the Civil War, gages were used by the Army to advantage, and that the inspector had his troubles.

EARLY IN AUGUST, 1940, it became evident that the peacetime capacity of the gage industry, which normally does a business from three and one-half to four million dollars, would be insufficient to meet the visualized load of the projected munition programs, taking into consideration Navy, Air Corps and Ordnance requirements.

The problem was presented during the summer of 1940 to the Office of the Assistant Secretary of War which is charged with industrial planning and to the Chief of the Tool Section, Advisory Commission of The Council of National Defense, the office that later became The Office of Production Management.

From surveys made in September 1940 the first general gage expansion program was initiated and approved by President Roosevelt Oct. 15, 1940 to the extent of approximately four million dollars for increased gage making facilities. This has been followed by four other expansion programs, the total resulting in the expansion of over one hundred gage making plants at a cost of approximately twenty million dollars. It is estimated that these facility expansions will have increased the gage making capacity of the country from four million dollars per year in 1940 to approximately one hundred twenty-five million by December, 1942.

New thread gage design

From this short resume of the gage facility expansion program, it must be quite evident that the Ordnance Department has been closely following the trend of gage requirement and providing new sources of supply as fast as the demand presented itself. This balance of supply and demand has been accomplished by studying production programs in advance and increasing gage facilities far enough ahead of the programs to meet the objective. This also kept our gage designers looking over the ordnance designers shoulders.

A definite policy of design, distribution, surveillance and procurement was set up before this war and with the cooperation of private industry, the Ordnance Department was able to carry out its gage program with little technical difficulty. During this period, a thread gage design was completed for all National Coarse & Fine Threads and placed on drawings complete in every detail. Prints of these drawings are available at Ordnance establishments throughout the country.

The absence of a sound and clearly defined gaging policy often results in an excessive amount of rejections at final inspection because of dimensional inaccuracies, also, in unnecessarily high overall production costs, and in frequent misunderstandings between Production and Inspection.

A sound and easily understood gaging policy is based on a realistic conception of the theory of gaging and on a familiarity with modern manufacturing practices. It covers the intelligent selection and specification of gages in accordance with gaging theory. It includes a standard method of evaluating and allocating both gage makers' tolerances and wear allowances.

A gaging policy

Strangely enough, there is no universal policy of such a nature today. Some of the larger manufacturing organizations have developed their own individual policies but no two of these are exactly alike. Organizations with less experience in precision manufacture usually have never attempted to develop a gaging policy.

The Ordnance Department has developed a gaging policy which is superior to most other policies because it recognizes the vital importance of wear allowance and combines wear allowance with gage maker's tolerance, allocating entirely within the work tolerance zone. This allocation is graphically and dimensionally described on an Ordnance chart drawn up in 1927.

All Not Go plain plug gage tolerances are negative with reference to maximum work limit, and all Go plain plug gage tolerances are positive with reference to the minimum work limit. Tolerances for ring gages and snap gages are just the reverse of this. All gage tolerances and wear allowances are subtracted from the specified work tolerance. Generally five per-

cent of the work tolerance is taken as gage maker's tolerance for both Go and Not Go inspection gage members. To this, another five percent is added to the Go inspection gage member as a wear allowance.

IN ORDER TO PREVENT any conflict between shop and final inspection the working gage tolerance and working gage wear allowance for Go members are increased to 10 percent of the total work tolerance. The Not Go working gage tolerance is 10 percent. Thus, the inspection gages generally subtract 15 percent of the work tolerance for gage tolerance and wear allowance, while the combined tolerance and wear allowance for the working gages subtract 30 percent. These are maximums.

Thus, any work part which is acceptable to the working gage will automatically be passed by the inspection gage. There can be no combination of actual gage tolerances or combined tolerances and wear allowances which will prevent this. Furthermore, with a definitely specified wear allowance, there is never any doubt about the proper time to retire any individual gage. In addition to this, where the question of alignment, concentricity, and other factors is involved we use an additional inspection gage dimensioned to what we call "the 40 percent rule." This gage limits the eccentricity, to take one factor as an example, of any part to 40 percent of the minimum clearance between it and its mate thus holding each member on its own side of the fence.

PROPER DIMENSIONAL CONTROL to secure interchangeability of parts is the key to modern mass production. In the interest of national defense, we are now engaged in the greatest production effort ever undertaken in any country. The success of this production program requiring enormous quantities of interchangeable metal parts is dependent upon careful dimensional control. To obtain this and to avoid time-consuming selective assembly, dimensional limits are prescribed on Ordnance component drawings to insure the necessary interchangeability and proper functioning of parts which in turn demands the use of gages.

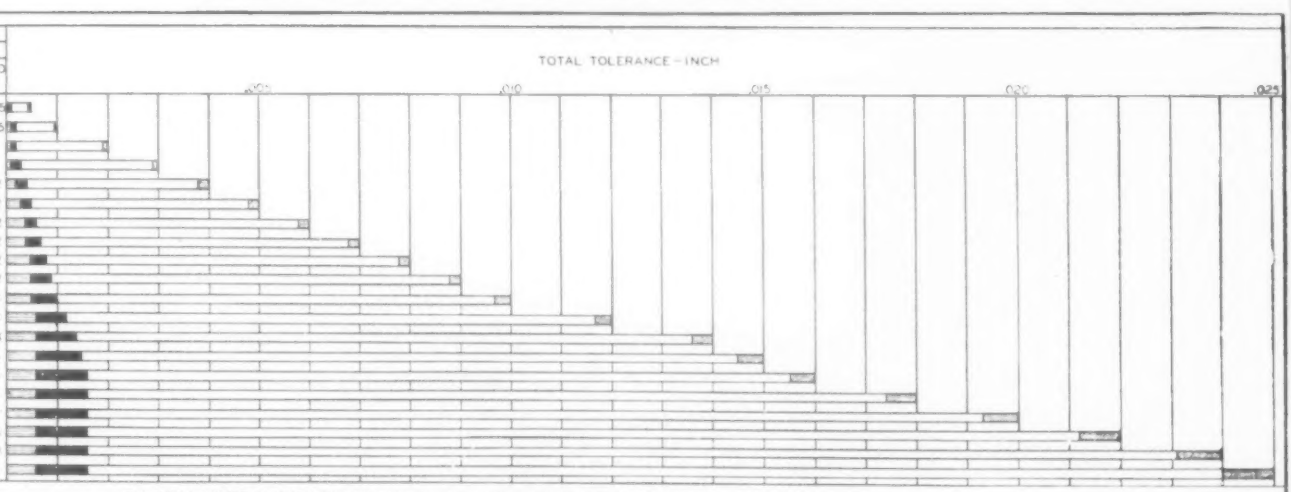
THE FUNCTIONS of the Gage Section, Office of the Chief of Ordnance, consist of administration and coordination of all matters pertaining to inspection gages, gaging and interchangeable mass production. To accomplish this, subdivisions of the section are maintained at all manufacturing arsenals, and control gage laboratories at all District Offices.

A gage laboratory consists of a group of precision instruments, properly housed and manned by skilled personnel charged with the responsibility of providing the precision measurements required to determine whether gages are within the very close limits prescribed on gage drawings. To illustrate the necessity for this increasing degree of precision, the manufacturer works to the component tolerance, the gage maker works to the gage tolerance, and the gage laboratory must measure to an accuracy that is a small fraction of the gage tolerance. The precision measurements of the gage laboratories are transmitted to the component by the inspector who in most cases has no previous machine shop experience.

THE ORDNANCE OFFICE has used every effort to prevent the use of excessively small tolerances on com-

Wear allowances and gage-makers' tolerances for Plain Plug and Plain Ring Inspection Gages, including Plain Ring Gages for major diameter of screws, and Plain Plug Gages for minor diameter of nuts.

GAGE			
TOTAL	WEAR ALLOWANCE	TOLERANCE GO	TOLERANCE NOT GO
	.0000	.0005	.0005
	.0001	.0001	.0005
	.0001	.0001	.0001
	.0001	.0002	.0001
	.0002	.0002	.0002
	.0003	.0002	.0002
	.0004	.0002	.0002
	.0004	.0003	.0002
	.0005	.0003	.0002
	.0005	.0004	.0002
	.0005	.0005	.0003
	.0006	.0006	.0003
	.0006	.0008	.0004
	.0006	.0009	.0005
	.0006	.0010	.0005
	.0006	.0010	.0006
	.0006	.0010	.0007
	.0006	.0010	.0008
	.0006	.0010	.0009
& UP	.0006	.0010	.0010



GAGEMAKERS TOLERANCE, FLUSH PIN AND ADJUSTABLE SNAP GAGES.

	.00005	.00005
	.00005	.00005
	.0001	.0001
	.0001	.0001
	.0002	.0002
	.0003	.0003
	.0004	.0004
& UP	.0005	.0005

NOTES.

THIS CHART SHOWS, BOTH NUMERICALLY AND GRAPHICALLY, WEAR ALLOWANCES AND GAGEMAKERS TOLERANCES FOR INSPECTION GAGES FOR COMPONENT TOLERANCES NOT LISTED, THE NEXT SMALLER TOLERANCE SHALL BE USED.
THE FIRST FOUR COLUMNS SHOW NUMERICAL VALUES, WHILE THE FOLLOWING PORTION OF THE TABLE SHOWS GRAPHIC VALUES.
COLUMN 1 SHOWS THE TOTAL TOLERANCE ON THE PRODUCT. COLUMN 2 THE WEAR ALLOWANCE ON THE "GO" GAGE.
COLUMN 3 THE TOLERANCE ON THE "GO" GAGE, AND COLUMN 4 THE TOLERANCE ON THE "NOT GO" GAGE.
THERE IS NO WEAR ALLOWANCE ON THE "NOT GO" GAGE BECAUSE IT WEARS TOWARD THE "GO" GAGE AND IN THE DIRECTION OF SAFETY.

ponent drawings, in order to lighten the corresponding burden that would be laid on the gage maker and on the laboratory.

Nineteen Ordnance gage laboratories have been established in the manufacturing arsenals and Ordnance procurement districts. The Ordnance gage laboratories are equipped with gage blocks, measuring machines, projection comparators, toolmakers' microscopes, supermicrometers, comparators incorporating the many principles of physics that have been applied to metrology during the past decade, and the numerous accessories required for precision measurement. The standards of all Ordnance gage laboratories are precision gage blocks, calibrated at the National Bureau of Standards by interfereometry methods which insure that Ordnance dimensional inspection is based on the United States legal standard of measurement. Arsenal and district gage laboratories are air-conditioned to provide the international standard measuring temperature of 68 degrees Fahrenheit (20 degrees Centigrade), and humidity is controlled to prevent corrosion of gages and instruments.

Greenfield Tap & Die Photo

The arsenal gage laboratories are responsible for the initial checking and acceptance of the vast quantities of inspection gages that are being procured. The results of their efforts can be seen in the status of the inspection-gage program as of June 1, 1942. When all anti-aircraft carriage contracts were gaged complete, 2068 sets of ammunition gages were in use in the districts, averaging 60 gages per set, and sufficient gages were on hand for other items to insure that inspection operations would cause no delay in production.

The district laboratories are responsible for the constant dimensional surveillance required to detect worn or damaged gages. The huge production scheduled for the fiscal year 1943 will place a heavy load on these laboratories as they must insure that the gages used by inspectors are functioning properly at all times. Since the beginning of this emergency, many of the contractors engaged in the production of Ordnance items have lacked the necessary measuring equipment and experience required for interchangeable manufacture. The district laboratories have made a very valuable contribution toward production by providing precision measurements on manufacturers' gages so that the contractors can proceed with production with an assurance that their dimensional control will meet Ordnance inspection requirements.

•

Foresight of the Ordnance Department in equipping these laboratories in the years prior to the emergency can be appreciated in the light of the serious shortage which has developed in the supply of precision measuring equipment due to the restriction of foreign sources of supply and the long period required to manufacture precision equipment. Nine of the district laboratories were set up in universities between 1930 and 1939. They were placed on an activated status in 1940 by the districts.

To the gage industry, which has a wealth of experience personified in this veteran gage maker, "the Ordnance Department is greatly indebted." According to Colonel Hambleton, its fine cooperation made possible the meeting of the objective of the department's enormous program.

THE ORDNANCE DEPARTMENT is constantly striving to improve gaging methods, particularly with a view to obtaining faster inspection. Multiple purpose gages employing electrical means for amplification, have been developed and procured for inspection of machined shells, cartridge cases, primers, and fuse components. These gages check simultaneously practically all external and some internal dimensions of components, at an inspection rate that compares favorably with the highest production rates. Pneumatic gaging devices for the internal dimensions of the 20 mm. fuze have been developed and procured for use at all facilities producing this fuze.

Pneumatic devices for gaging gun bores permit fast and accurate inspection, and do not require highly skilled operators. A dial indicator gun bore gage has been developed for cannon, and another device employing pneumatic actuation with electrical amplification has been developed for cannon and recoil inspection. The Ordnance Office fostered the development of optical projection inspection methods which has resulted in faster inspection of rifle parts. Optical projection inspection methods are now being introduced at small arms facilities in the Districts on all small arms contracts. The Ordnance Department has under development a new high speed gaging device for small arms ammunition. This device will reduce the quantities of metal gages required and provide for fast and accurate inspection.

DEVELOPMENT of high speed multiple purpose gages has been timely because of the difficulty encountered in employing sufficient inspection personnel. In most cases, the introduction of multiple purpose gages has resulted in a large reduction of inspection personnel. Not only is this true but less highly trained inspectors are used, and these are able to perform their tasks with the highest degree of accuracy.

A recent development of interest is the production of glass gages particularly adaptable to ring, plug and contour or profile types.

The Ordnance Department is greatly indebted to the gage and tool industry for its fine cooperation, without which, it would have been impossible to meet the objective of this enormous program

THE END

How to Select the Right Grinding Wheel

H. J. WILLS
ENGINEER
THE CARBORUNDUM COMPANY

This is the second of two installments. The Production Data Sheet, giving specifications for wheels on internal grinding, appears on page 99.

IT IS EVIDENT that the hardness, the tensile strength and the ductility of the material being ground affect the stresses that are set up in the wheel.

The magnitude of these stresses determines which abrasive material should be used, because manufactured abrasives can be had in various degrees of hardness, toughness and friability.

Crystals of regular aluminum oxide do not break readily. This adapts them to grinding high tensile strength materials which set up stresses tending to the crystals before they become dull. The resistance of low tensile strength materials would not be sufficient to break the crystals soon enough.

Aluminum oxide is therefore used for materials of a tensile strength of say 50,000 pounds per square inch or more, such as carbon steels, alloy steels, high speed steels, annealed malleable iron, wrough iron and tungsten.

"Regular" — that is to say "standard" — silicon carbide is harder, less tough and more easily broken than regular aluminum oxide. Because of its hardness it is suitable to hard materials. Strangely enough it is also especially suitable for grinding very soft materials of low tensile strength because its crystals break before they dull, and their hard sharp edges remove stock readily.

The comparatively brittle silicon carbide crystals are broken by tough high tensile strength materials before they have become dull. Silicon carbide is thus suited to such diverse materials as gray and chilled iron, very hard alloys and cemented carbides on the hard side, and aluminum, copper, brass and soft bronze on the soft side.

To meet special requirements it is possible to produce both abrasives with altered characteristics. To give one example: Aluminum oxide can be produced which is tougher than silicon carbide but whose crystals are more easily broken than those of regular aluminum oxide. This abrasive is used for making light finish cuts on materials of high tensile strength. The slight stresses set up by the small infeed would not break crystals of regular aluminum oxide, but will break those of this special one.

Such a modified form of aluminum oxide abrasive is also useful in internal grinding, where the larger the wheel the more economical the operation. But with a large wheel, as we have seen, the area of contact is increased and the stresses on each grain reduced to the point where the grains of regular aluminum oxide would not fracture soon enough to keep the wheel self sharpening.

The choice of grain size depends upon the material to be ground, the amount of material to be removed and the surface qualities and the finish desired. Generally to remove soft material rapidly, use large grains. Hard material can be removed faster with small grains because they penetrate better, and the smaller chip size is more than off-set by the larger number of chips. Fine grains obviously produce a better finish.

Wheel structure

The "structure" of a wheel refers to the relation between the abrasive grains, the bonding material and the void spaces that separate them. Wheels can be made of various degrees of denseness from very close to very wide spacing of the grains.

Open structure is desirable when grinding soft, ductile materials in order to decrease the likelihood of the wheel face loading with material.

Close structure is indicated for grinding hard materials with fine grain abrasive, in order to present as many grains as possible to the work in a given time. Close structure will give a better surface finish than open structure. To prevent a wheel with a formed face from breaking down too quickly, use a close structure so that the stresses will be borne by a greater number of grains.

•

Vitrified bonded wheels are not affected by water, acid, oils or ordinary temperature conditions. They are porous and strong, and so give high stock removal.

Silicate bond wheels release the abrasive grains more readily than vitrified wheels. Because they are cool cutting, they are suited to jobs and materials which cannot be subjected to much heat. Grinding edged tools is best done with silicate wheels.

Shellac bond produces a high finish, and, because it is cool cutting it is used for hardened tool steels and thin sections.

Resinoid bonded wheels are cool cutting, remove stock rapidly, are strong, and can be operated at high speed.

Rubber bonded wheels produce a fine finish. Because it is strong and tough, rubber bond is used in making very thin cut-off wheels.

•

Earlier in this article, when discussing the stresses set up in a wheel by grinding, we mentioned the grade of a wheel — sometimes spoken of as its "hardness". It is actually the strength with which the bond holds the grains in the wheel, and resists the tendency for them to be torn out by the stresses of grinding.

Considering only the stresses set up in the wheel, the reasons for the following general rules for selecting the grade of a wheel are plain:

Use a hard grade for a soft material and a soft grade for a hard material.

For a small area of contact use a harder grade, and for a large area of contact a softer grade.

The higher the ratio of wheel speed to work speed the softer the wheels should be, and vice versa.

The grade to use depends also upon

the type and condition of the grinding machine on which the wheel will be used. A heavy, rigid machine will take a softer grade than a light one. Any condition that causes machine vibration, such as a loose spindle or inadequate foundations make it necessary to use wheels of harder grade than would be needed on a well kept machine.

In the main, the best wheels for given jobs of centerless and internal grinding can be determined from the fundamental principles given in this article. More specifically:

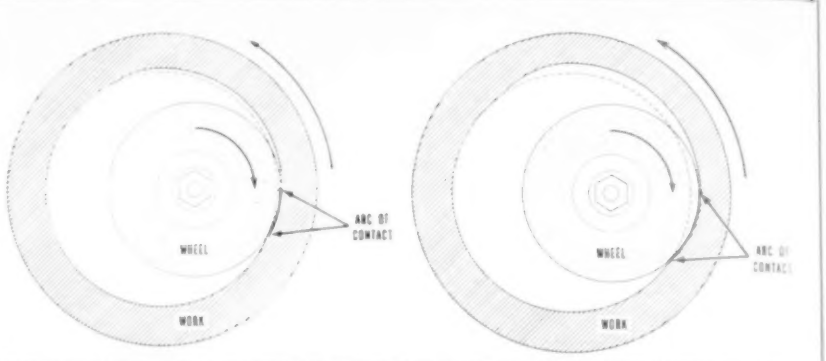
In centerless grinding the grain size runs from 36 to 80 for commercial roughing and finishing, and from 80 to 600 for high and ultra finishes. The most common sizes are from 40 to 60.

Finer than average grain sizes are used when wheel and work are small; for hard, dense, fine-grained metals of low ductility; for hardened metals when the amount of stock to be removed is small; and when forms, fillets and radii have to be kept to close tolerances.

Coarser than average grain sizes are used for soft, ductile materials; and where high stock removal, usually on unhardened material, is essential.

Because of the peculiarities of centerless grinding it is impracticable to set down general rules for selecting the type of bond to use. A few typical examples are given in the Table of Wheel Recommendations.

The grades used in centerless grinding range from J to P for commercial roughing and finishing of soft steels and from N to S for commercial roughing and finishing of hard metals. The most commonly used grades for commercial grinding range from K to P.



The arc of contact is measured along that portion of the circumference of the wheel which is in contact with the work. The arc of contact in the sketch at the right is larger than in the one at the left because of increased infeed.

In general, harder grades are required for small diameter work and wheels; and where forms, fillets and radii must be held to close tolerances. Softer than average grades are used for hard, dense, fine grained metals of low ductility; where high stock removal is necessary; and for hardened metals.

The wheel structure used in centerless grinding is in the standard range.

Work and wheels of small diameter require standard to dense structure. Hard, dense, fine-grained metals of low ductility require standard to open structure. Soft, ductile materials call for open structure. High stock removal usually requires standard to open structure. Forms, fillets and radii require standard to dense structure.

In internal grinding the grain size ranges fom 36 to 100 for commercial roughing and finishing, and from 120 to 600 for high and ultra finishes — the most commonly used sizes being from 40 to 80.

It is best to consult the wheel manufacturer as to the type of bond best suited to the job.

The grade of bond runs from J to M for commercial roughing and finishing of soft steels, and from K to S for commercial roughing and finishing of hard metals.

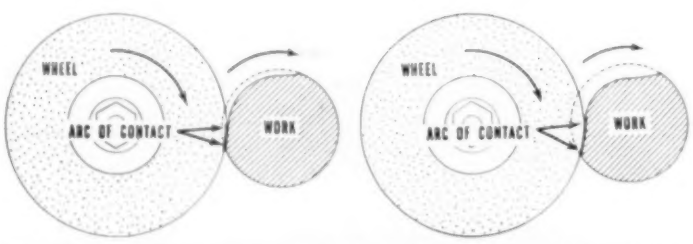
The wheel structure is in the standard range.

In the Table of Wheel Recommendations are given a few wheel selections which are typical. It should not be assumed, however, that these are guides for even an identical job.

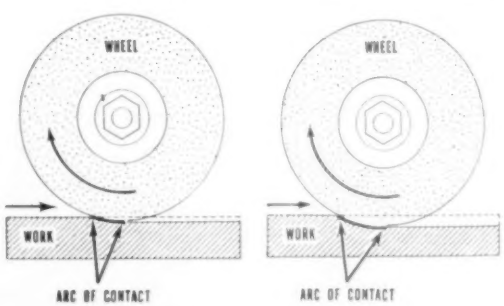
However, the selections given — and especially the underlying fundamentals of grinding action as given in this article should make it possible to select a few wheels that are not far from the best one.

A good guide in wheel selection is. "Only a test will show what is best."

THE END.



The arc of contact is measured along that portion of the circumference of the wheel which is in contact with the work. In the sketch at the right, where the infeed is increased, the arc of contact is increased. Conversely, when the infeed is decreased, the arc of contact is also decreased. Generally, a small area of contact means that a relatively soft wheel grade is used. For a large area of contact, a harder grade is employed.



The arc of contact is measured along that portion of the circumference of the wheel which is in contact with the work. The arc of contact at the right is larger than that at the left because of increased infeed.

PRODUCTION DATA SHEET

TABLE OF WHEEL RECOMMENDATIONS

INTERNAL GRINDING

This table shows a number of typical wheel recommendations for a variety of internal grinding operations. Supplementing the second half of an article by H. J. Wills, of the Carborundum Company, which appears elsewhere in this issue of *The Tool Engineer*, it was selected for presentation on the basis of its usefulness to engineers engaged on America's Production Front.

Though this material should not be construed as always indicating the best wheel, even for jobs identical to those listed, it is believed to be a general and safe guide. Possessing an understanding of the principles of grinding action *(see The Tool Engineer, September, 1942, and Mr. Wills' article in this and the November, 1942, issue)*, the engineer may use this chart to select wheels for numerous operations. Tests will quickly prove the wheel best suited to the job, the peculiarities of the shop, and the operator.

A similar table of wheel recommendations for centerless grinding appeared in the November, 1942, issue of *The Tool Engineer*.

PART, MATERIAL & OPERATION	ABRASIVE	GRAIN SIZE	GRADE	BOND
ALUMINUM AND ITS ALLOYS	SILICON CARBIDE	36	HARD	VITRIFIED
	" "	36	MEDIUM	"
	" "	60	SOFT	"
BALL RACES, RADIAL, HARDENED STEEL	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	60 or 80 COMB.	MEDIUM	"
	" "	60 or 80 COMB.	SOFT	"
BRASS	SILICON CARBIDE	36	HARD	VITRIFIED
	" "	50	MEDIUM	"
	" "	50	SOFT	"
BRONZE, HARD	ALUMINUM OXIDE	60	HARD	VITRIFIED
	" "	60	MEDIUM	"
	" "	60	SOFT	"
BUSHINGS, HARDENED STEEL	ALUMINUM OXIDE	60 COMBINATION	HARD	VITRIFIED
	" "	60 "	MEDIUM	"
	" "	60 REGULAR	SOFT	"
BUSHINGS, CAST IRON	SILICON CARBIDE	36	HARD	VITRIFIED
	" "	36	MEDIUM	"
	" "	50	SOFT	"
CAM ROLLERS, HARDENED STEEL	ALUMINUM OXIDE	80	HARD	VITRIFIED
	" "	80	MEDIUM	"
	" "	80 COMBINATION	SOFT	"
CAST IRON	SILICON CARBIDE	24 or 36	HARD	VITRIFIED
	" "	24 or 36	MEDIUM	"
	" "	36 or 50	SOFT	"
CONNECTING RODS	ALUMINUM OXIDE	60 or 60 COMB.	HARD	VITRIFIED
	" "	60 or 60 COMB.	MEDIUM	"
	" "	60 COMBINATION	SOFT	"
CYLINDERS, GAS ENGINE	SPECIAL SILICON CARBIDE	36	HARD	VITRIFIED
	" " "	36	MEDIUM	"
	" " "	36	SOFT	"
GEARS, HARDENED STEEL	ALUMINUM OXIDE	60 COMBINATION	HARD	VITRIFIED
	" "	60 COMBINATION	MEDIUM	"
	" "	60 COMBINATION	SOFT	"
PIPE, SOFT STEEL	ALUMINUM OXIDE	20	HARD	VITRIFIED
	" "	20	MEDIUM	"
	" "	24 COMBINATION	SOFT	"

PRODUCTION DATA SHEET

PART, MATERIAL & OPERATION	ABRASIVE	GRAIN SIZE	GRADE	BOND
ROLLER BEARING CUPS	ALUMINUM OXIDE	60 or 60 COMB.	HARD	VITRIFIED
	" "	60 or 60 COMB.	MEDIUM	"
	" "	80 or 80 COMB.	SOFT	"
STEEL, HARDENED	ALUMINUM OXIDE	60 COMBINATION	HARD	VITRIFIED
	" "	60 or 60 COMB.	MEDIUM	"
	" "	60	SOFT	"
STEEL, SOFT	ALUMINUM OXIDE	60 or 60 COMB.	HARD	VITRIFIED
	" "	60 or 60 COMB.	MEDIUM	"
	" "	60 or 60 COMB.	SOFT	"
STEEL, HIGH SPEED	SPECIAL ALUMINUM OXIDE	60	HARD	VITRIFIED
	" " "	60	MEDIUM	"
	" " "	80	SOFT	"
STEEL, STAINLESS	SILICON CARBIDE	50	HARD	VITRIFIED
	" "	50	MEDIUM	"
	" "	50	SOFT	"
	SPECIAL ALUMINUM OXIDE	60	HARD	"
	" " "	60	MEDIUM	"
GAGES, RING, CARBON TOOL STEEL			MEDIUM	VITRIFIED
ROUGHING	ALUMINUM OXIDE	60 COMBINATION	MEDIUM	"
SEMI-FINISHING	SPECIAL ALUMINUM OXIDE	100	HARD	RESINOID
FINISHING	ALUMINUM OXIDE	320		
GAGES, RING, HIGH SPEED STEEL (18-4-1)				
ROUGHING	SPECIAL ALUMINUM OXIDE	60	SOFT	VITRIFIED
SEMI-FINISHING	" " "	100	MEDIUM	"
FINISHING	ALUMINUM OXIDE	320	HARD	RESINOID
GAGES, RING, OIL HARDENED TOOL STEEL				
ROUGHING	ALUMINUM OXIDE	60 COMBINATION	MEDIUM	VITRIFIED
SEMI-FINISHING	SPECIAL ALUMINUM OXIDE	100	"	"
FINISHING	ALUMINUM OXIDE	320	HARD	RESINOID
DIES, BLANKING				
CARBON DIES STEELS	ALUMINUM OXIDE	60 COMBINATION	MEDIUM	VITRIFIED
	SPECIAL ALUMINUM OXIDE	60	"	"
HIGH CARBON, HIGH CHROME DIE STEELS	" " "	60	"	"
	ALUMINUM OXIDE	60 COMBINATION	"	"
MISCELLANEOUS ALLOY DIE STEELS	" "	60 "	"	"
	SPECIAL ALUMINUM OXIDE	60	"	"
DIES, DRAWING				
CARBON DIE STEELS	SPECIAL ALUMINUM OXIDE	60	MEDIUM	VITRIFIED
HIGH CARBON, HIGH CHROME DIE STEELS	" " "	60	"	"
TUNGSTEN DIE STEELS	" " "	46	SOFT	"
MISCELLANEOUS ALLOY DIE STEELS	" " "	60	MEDIUM	"
CEMENTED CARBIDES	DIAMOND	100	—	—
DIES, DEEP DRAWING				
CARBON DIE STEELS	SPECIAL ALUMINUM OXIDE	60	MEDIUM	VITRIFIED
HIGH CARBON, HIGH CHROME DIE STEELS	" " "	60	"	"
MISCELLANEOUS ALLOY DIE STEELS	" " "	60	"	"

NOTE: On this and the preceding page is the fourteenth of a series of Data Sheets to be published in THE TOOL ENGINEER. A handy three ring binder can be secured at any dime store to hold the sheets for quick reference.

An Important Message to All Turret Lathe Users:

Don't Buy Standard Turret Lathe Tools Unless You Need Them *Now!*

There is a definite shortage of Turret Lathe Tools to equip machines for vital War Production.

Return For Credit Surplus New Warner & Swasey Tools

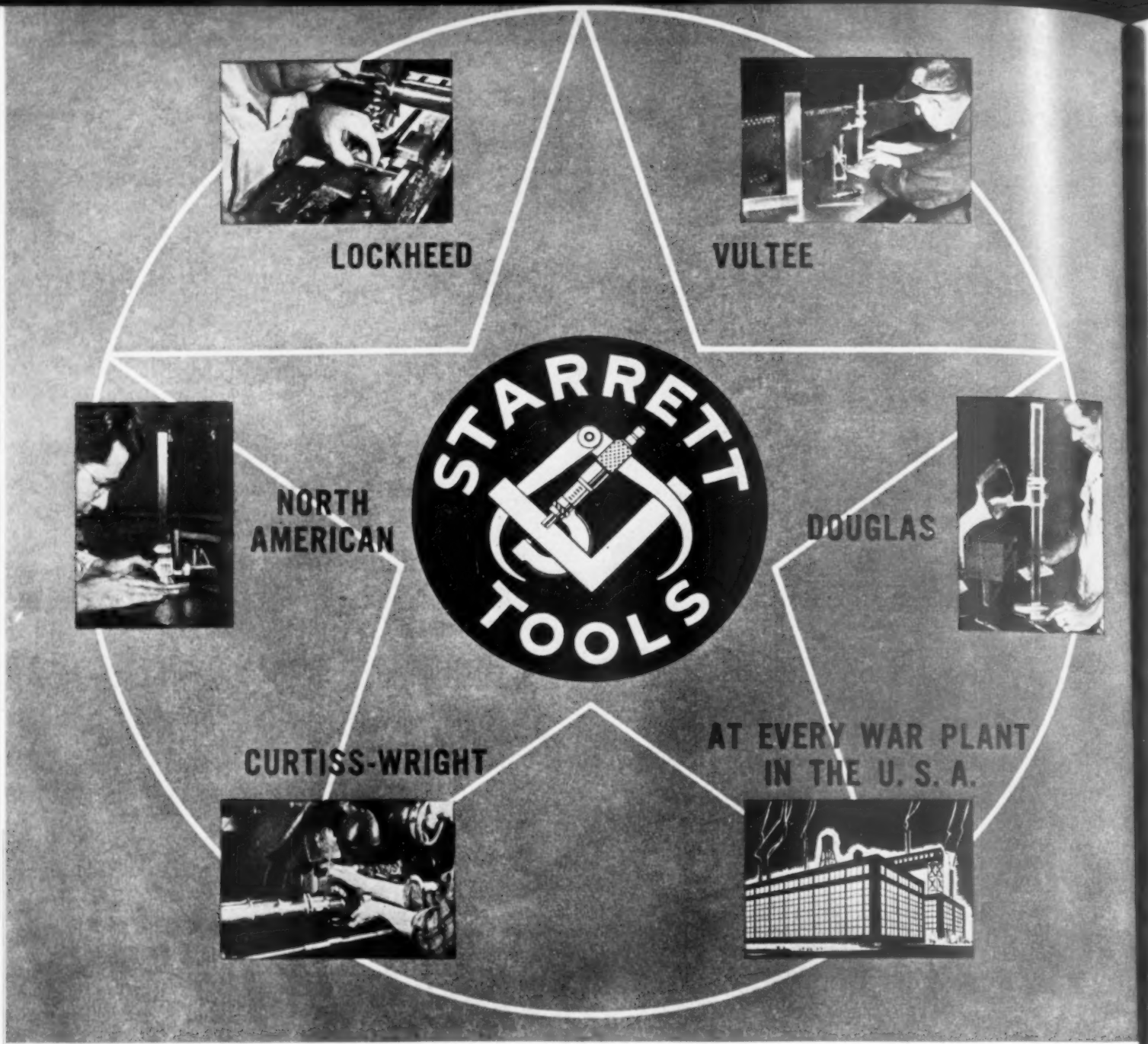
Defense Plant Corporation will authorize the return of surplus materials. Present shortages cover practically all standard tools shown in Warner & Swasey Tool Catalog No. 38. Greatest shortages are on the following items:

Single Cutter Turners **Multiple Turning Heads (All Types)**
Slide Tools (All Types) **Adjustable Turning Heads**
Angle Cutter Holders (All Types)

Return for credit any new Warner & Swasey tools. For instructions write or phone the nearest Warner & Swasey office:

Boston . . . . . Kendall Square Building
238 Main St., Cambridge, Mass.
Buffalo . . . . . Iroquois Building
Church and Franklin St.
Chicago . . . . . 618 W. Washington Blvd.
Cleveland . . . . 5701 Carnegie Avenue
Dayton . . . . 436 Mutual Home Building
Detroit . . . . . 1308 Maccabees Building
Houston . . . . . 409 Velasco Street
Los Angeles . . . . 1118 Santa Fe Avenue
Milwaukee . . . . . 818 Wells Building
324 E. Wisconsin Ave.
Newark . . . American Insurance Building
15 Washington St.
Philadelphia . . . . . 6910 Market Street
Upper Darby, Penna.
Pittsburgh . . . 505 Medical Arts Building
Syracuse . . . . . 517 Erie Boulevard East

WARNER & SWASEY FOR VICTORY



Starrett Precision Measuring Tools are potent weapons in the hands of America's army of skilled plane production craftsmen. They contribute to the winning of the war in the same way as do the precision products they help to make — by justifying the confidence of their users — permitting them to make the most of their skill and experience and will-to-win . . . We shall continue to exert every ounce of effort to produce an adequate supply of the tools worthy of this responsibility.

THE L. S. STARRETT CO • ATHOL • MASSACHUSETTS • U. S. A.

World's Greatest Toolmakers

STARRETT

PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES

Men, Materials and Machines

O.W.I. Photo by Palmer

First objective in material conservation is in the proper design of parts to reduce scrap from production. Second is the gathering and segregation of scrap metals and other vital materials used in armament manufacture. This photo illustrates the gathering of metallic chips and cuttings from machining operations on the American medium tank.

A Program for MATERIAL CONSERVATION

Success or failure of the war effort on the industrial front may depend on intelligent material conservation. Here is how one great builder of aircraft is solving the problem.

FRANK ADLER

MECHANICAL ENGINEER
DOUGLAS AIRCRAFT CORPORATION

CONSERVATION can be applied in such a multitude of ways in industry today that it must be treated in a broad sense. Some of the least considered but nonetheless important phases can be directly classified under material conservation.

At the present time, the Douglas Aircraft Corporation has a program of material conservation which is unusually inclusive. Education, engineering, planning and tooling are the four main points in this plan.

Let's start with education. Education in material conservation is not an easy matter, since speed has been and is the by-line of industry today.

Many think of material conservation as applicable only to such tangible items as vital war materials. This is, however, but one conception of the idea. It also applies to conservation of energy — electricity, water power, water and air. The last statement may seem outside the realm of engineering, but electrical power must be generated, expending steam, water, and oil. Nonetheless, if you could, by increasing your number of machines, eliminate an hour's work a day, and thus

eliminate overtime and save money, you would be saving everything but material.

Assume that the machinery was electrically powered. Not only would vital metals and materials be tied up in new equipment, but load would be added to the power lines. If every plant in a community did this, additional power developing and transmitting equipment would have to be installed. Though you would save money for your company, you would be expending a great deal in vital materials.

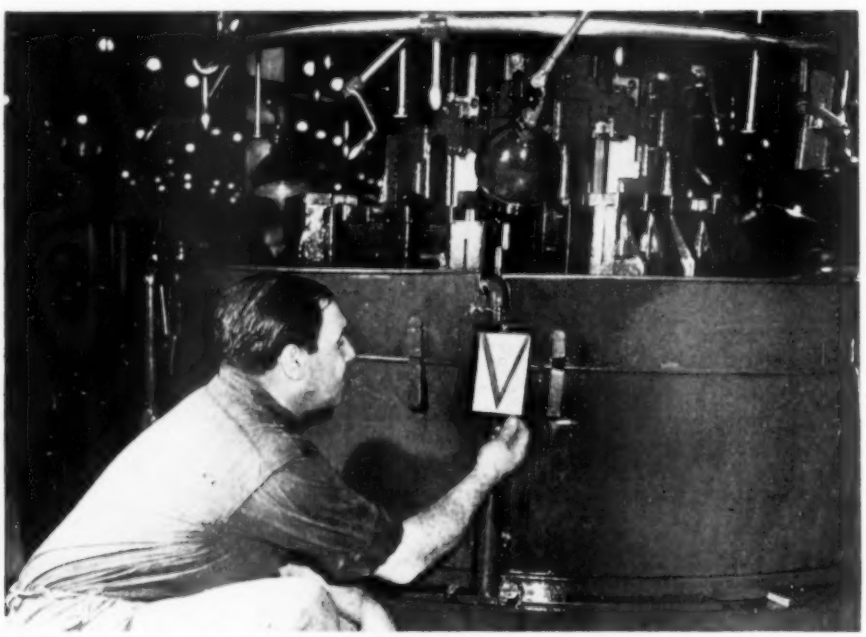
The point is that when weighing the advantages and disadvantages of a problem, thought must be given to the indirect material conservation as well as to the conservation of time.

Machine operators in your plants can and should be shown, through posters and trick slogans, ways of conserving materials.

Punch press operators throw away scraps of material that they know contain enough surface to produce one more part of the type they are making. Yet, because it is easier to pick up a new sheet of material, they produce "scrap" rather than turn their sheet of holes around to a different position to obtain another part.

Education in careful workmanship will save material.

The machinist who takes the roughing and finishing cuts on materials, without taking the time to check sizes as he digs the cutting tool into the material, even though he realizes he is coming close to the end of the operation, rarely gets a satisfac-



Wright Aeronautical Photos

Scrap segregation in Wright plants is facilitated by colored "V's" on machines to symbolize the type of scrap metal each one produces.

Color Code for Salvage

American engineers are engaged in an intensified nation-wide program of conserving strategic materials needed in war production. This article tells how a mass-producer of huge aircraft engines uses a color code system to facilitate the salvage of vital metals.

BASIS of material conservation in the big plants of the Wright Aeronautical Corporation is a carefully integrated plan for salvaging thousands of tons of vital scrap from steel, aluminum and other high-grade metals used in the mass production of radial, air-cooled aircraft engines.

Success of the plan lies in the fact that these materials may be quickly returned as clean scrap to the sources of strategic raw materials needed in the war effort.

First to be evolved in the aviation field, this all-out program of scientific salvage control was also the first to be coordinated with the nation-wide efforts of the War Production Board according to Wright engineers. This coordination has had the effect of sending salvaged metal to steel companies, shipyards, tank manufacturers, as well as to smelters for reprocessing in the aviation field.

This system, evolved by the Wright company and now used in an increasing number of industries, has the advantage of segregating the various metals as fast as they are removed from forging and casting by lathe, drill or milling machines. Basic element of the plan, as worked out in the concern's machine shops in Paterson New Jersey, is to separate and save metals as fast as they are removed by machining processes. Consequently, machine tools, from small boring machines to turret lathes, have bins attached which catch and hold all shavings and chips or whatever waste is produced by that machine tool.

Inasmuch as Wright Aeronautical is now employing "in-line" production methods, where a machine tool is used on one specific part only, such a tool always produces the same kind of scrap.

Salvage collectors wheel large boxes up and down the factory aisles, collecting only one type of metal. To eliminate the possibility of mixing metals, the containers are identified with the machine tools by a foolproof color-marking system. The containers are marked with a specific color for each metal, the coloring being in the form of a large "V", painted on the side of the box. Each machine tool producing this type of scrap is marked by a card on which is painted a

job the first time he "chucks" his material. He may be a fast man, but often times the "fast" men prove to be the most costly.

This is one of many examples showing that careful workmanship, through proper education, is an important method of material conservation.

The second basic point in the Douglas program for material conservation concerns engineering. Inasmuch as this is a war of production, many young engineers feel that they can do more by following their profession than by shouldering a gun. However, in order that they do a complete job of their engineering work, there are two items they must keep in mind that will aid the material conservation program and greatly increase their value as designers.

First, simplicity of design for easier manufacture, will not only conserve manpower in fabrication, but will also conserve materials inasmuch as a part easily fabricated is one which seldom has to be rejected.

As an example, a spar cap was designed in the Douglas engineering department which contained many compound angles in a series of steps on one face.

After hours of labor in the tool design department, tools were designed to fabricate this cap. When the tools were made, errors were found in calculations on an angle in the tooling, and the first few caps were rejected because of their inability to fit the ship.

At this point, men in charge of tooling decided to learn if engineering

Continued on the following page

"V" in identical colors. Thus a worker collecting steel, which is identified by a green and yellow "V", gathers the shavings and chips from every machine tool which bears a card carrying a green and yellow "V". Collectors gathering aluminum alloy watch for cards with a yellow "V".

Although steel, aluminum and magnesium are the principal metals salvaged, copper, beryllium bronze, phosphor bronze, aluminum bronze, brass and a variety of others are also collected.

Employees cooperate

Throughout the plants, full cooperation is received from employees in keeping metals separated so that one critical metal will not be rendered useless by mixing with another. Special "monitors" have been assigned to go from machine to machine and see that salvage procedure regulations are strictly adhered to.

The same scientific control of salvage has been applied to all nonmetallic products in the shops of this concern. For instance, special scientific separators, on the principle of the dairy machines which separate milk and cream, spin oil-soaked chips and shavings at high speed, until the valuable cutting oil has been separated from the chips. Known in the shops as "whizz" machines, these separators are reclaiming thousands of gallons of cutting oil vital in today's high speed operation.

In its efforts to find a use and a user for everything, Wright goes far beyond the salvage of top-of-the list items like metals and oil. It saves and utilizes such things as paint pails, five-gallon tins, empty oil drums, old rags, burlap bags, cardboard and paper, used files, old grinding wheels, barrels, and nail kegs. Waste paper, cardboard and old rags are salvaged at the rate of two tons or more per day.

Worn tools to other firms

Used drills and cutting tools, no longer fitted for the exacting requirements of aircraft engine building, have been found by Wright to be still useful to other war-working firms where requirements are not so exacting as in engine building. When broken and dulled beyond reclamation, all used drills, reamers and other cutting tools are sent to outside smelters of high speed steel.

From all of the Wright plants the scrap—steel, aluminum, magnesium, wood, paper, rags, stone, used tools and a thousand other items—moves in a steady stream to a central salvage yard, where it is shipped to reclaiming points, usually on the same day it enters the yard.

So vast is the amount of metal salvaged by this engine manufacturer that mechanical shovels are necessary for loading railroad cars and trucks in its scrap yards. One of the Wright plants has an individual chip-handling system, with overhead hoppers which can load a gondola-type railroad car in eight minutes.

Finally, this concern's plants are now producing another type of scrap only indirectly concerned with mass production. Employee organizations have begun a tin can salvage drive, using the collective ability of thousands of employees, coming from dozens of communities, to turn back into the war effort the tin and steel in cans.

Containers are being placed at every entrance, where employees coming to work may deposit cans previously cleaned, de-labeled and flattened for convenience in shipping. As fast as practical, shipments in bulk are to be made to de-tinning points. Proceeds from tin can salvage are directed by employee organizations, go to war relief funds.

THE END.

Scrap metal at Wright Aeronautical is cleaned from machines into boxes marked with same color of "V" as designated on the machines.

could simplify the design, not because the problem was too hard for tooling, but because of the expense involved in tools and parts.

After a short discussion, the engineering department found that it could make a small change in the design and simplify tooling considerably.

This was done, and the results were highly satisfactory. The fabrication time of the parts was cut by 50 per cent, the cost of changing the old tooling was negligible, and the caps fit.

Second, material stock available, should be kept in mind by the designing engineer. If it is possible, use standard parts. If a new design is necessary, stock items, used to advantage in design specifications, can frequently cut material expenditures.

Material specifications should be written with an eye to the standard size sheets or bars of stock available. For instance, it has often been found necessary to use a ¾-inch round bar stock to obtain a .531 diameter when, on investigation, it was found that a dimension slightly under a half inch would work just as satisfactorily (see Boring and Boring Tools, Tool Engineer, Nov. 1942). This would enable a stock size of a half inch diameter to be used, thus conserving material. If our bar stock were of cold rolled steel. Saving in weight would be approximately 55 per cent.

Many times, a machinery part can be made from a forging, or fabricated from several sections of prefabricated material. The quantity required is the key factor. Many times, on small pro-

(Continued on page 110)

New Techniques in Salvage Conserve Vital Materials

General Electric and Westinghouse, two of the nation's largest mass-production industries, offer constructive material conservation programs.

OUTSTANDING among examples of how industry has tackled the problem of relieving material shortages through salvage operations are two of the nation's largest manufacturers of electrical and related equipment.

In Westinghouse Electric and Manufacturing Co. plants, salvage and scrap collection are factory operations that rank with actual manufacturing procedure in attention received from production engineers and management.

Proof of this is the fact that an extra 5,000,000 pounds of war-needed materials were collected within a recent three-month period as a result of intensified drives by all divisions of the concern.

Nothing is spared in this company's attack on the scrap problem. Included in one drive were electric motors beyond repair. One division turned in 300,000 pounds of old metal parts. Rummaging through office desks, not below the production engineer at Westinghouse, turned up hundreds of pounds of metal paper weights and tons of paper. An abandoned transformer tank at the high voltage laboratory was dismantled to produce 10 tons of steel and five tons of copper. Five miles of old telephone line were ripped up to get eight tons of lead and another ton of copper.

In view of its continuing scrap salvage program, Ray Schmidt, acting director of the company's conservation program and an advisor to the Government's Bureau of Industrial Conservation, was amazed by the results of one intensified drive. In one plant, enough metal was turned in to build thirty-five 3,000-kilowatt generators. "This doesn't mean material was being wasted," he says, "but simply that employes concentrated on looking for metal".

•

In work benches almost five tons of seldom-used high quality steel tools were found. Three tons of rubber were collected during a two-week campaign, and included old conveyor belts, gaskets and countless office gadgets.

Such scrap drives actually are the second part in a two-part plan of material conservation at Westinghouse. The first job is to prevent scrap by making fullest possible use of the original materials. As an example, old welding rod stubs are turned in before new ones are given out. It was observed that electrodes were being discarded while still long enough to use. A box was devised which contains new

(Continued on page 110)

General Electric Photo

Typical war worker suggestion to save material came from a General Electric machinist, Swedish-born Alex Johnson.

He suggested a pattern change which reduces weight of brake wheel castings, lowers machining time by 10 per cent.

SEGREGATED *Scrap...* is your link to VICTORY!

Scrap salvage is a vital factor in the war effort. To be fully effective a scrap program must include methods for segregating and conserving critical alloying elements so urgently needed in the construction of tanks, guns, ships and planes.

Ferrous and non-ferrous metal scrap should be collected in separate containers at the machine where they are generated. Each class of high-speed tool steel and each type of constructional alloy steel should likewise be kept separate so that the alloy content can be returned to service.

Remember, — alloy scrap which is segregated, classified and labeled according to type and composition is a vitally important commodity today—and urgently needed to augment primary supplies of Nickel, molybdenum, tungsten, etc.

The metallurgical experience of our technical staff is available to aid you in these and other phases of metal salvage.

KEEP SCRAP MOVING INTO WAR PRODUCTION!

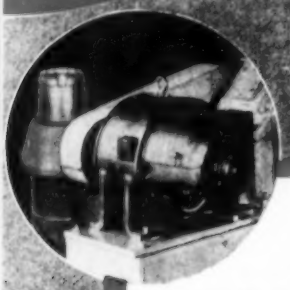
THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

FOR FACTORIES WITH A-C. POWER . .
A NEW PRODUCTION AID

AN ALL-ELECTRIC ADJUSTABLE-SPEED DRIVE for A-C. CIRCUITS

Speed Ranges up to 16 to 1
Sizes 1 to 30 hp.

RELIANCE V*S DRIVE

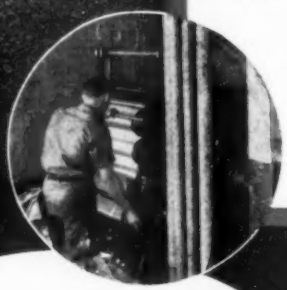


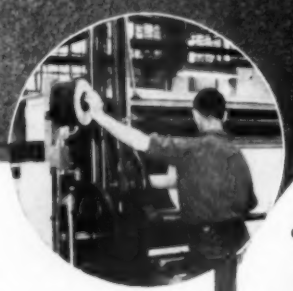
POWER

Plenty of it, applied directly without intermediate speed-changing devices.

SAFE SPEEDS FOR THREADING AND INCHING

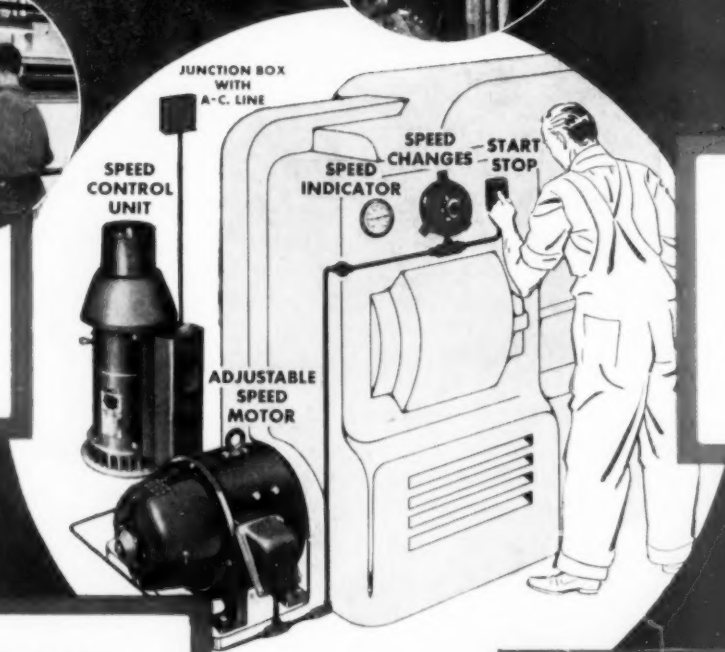
The drive can be arranged to give very slow speeds while threading material by hand or setting up work.





SPEED CHANGES

Smooth changes over ranges up to 16 to 1. Wider ranges under special conditions . . . Speeds can be adjusted while machine is in operation.



QUICK STOPPING

Obtained electrically either by operation of speed adjuster handle or *stop* button.

CONTROLLED ACCELERATION

Torque is provided to suit the job. No clutches are needed. Acceleration is smooth so that driven machine and material in process are not subjected to undue shock or strain.

SPEED SETTING

When set for a given operation the motor may be stopped and started without interfering with the speed setting.

All within Easy Reach

The Reliance V*S Drive provides control without limitations. Speed changer and start-stop station can be located anywhere that you can run a wire.

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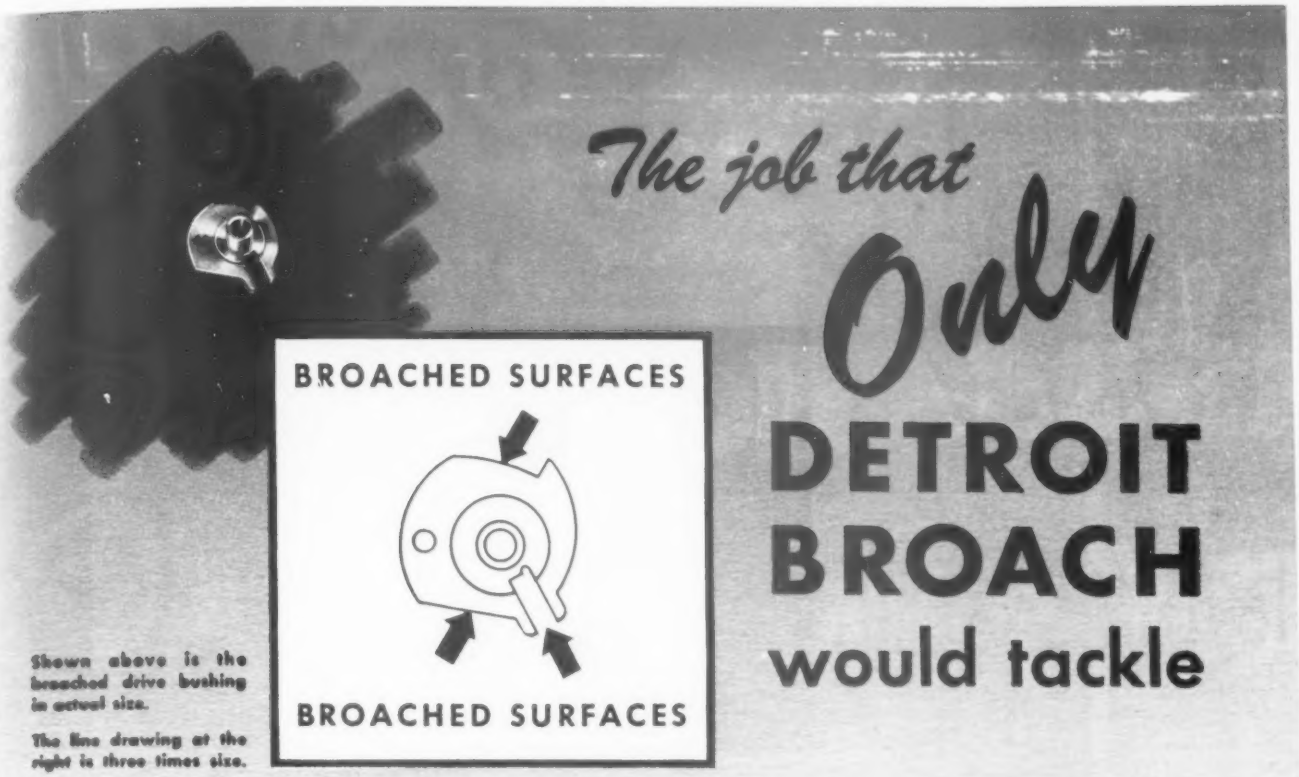
RELIANCE A-C D-C MOTORS



The job that

Only DETROIT BROACH would tackle

BROACHED SURFACES

BROACHED SURFACES

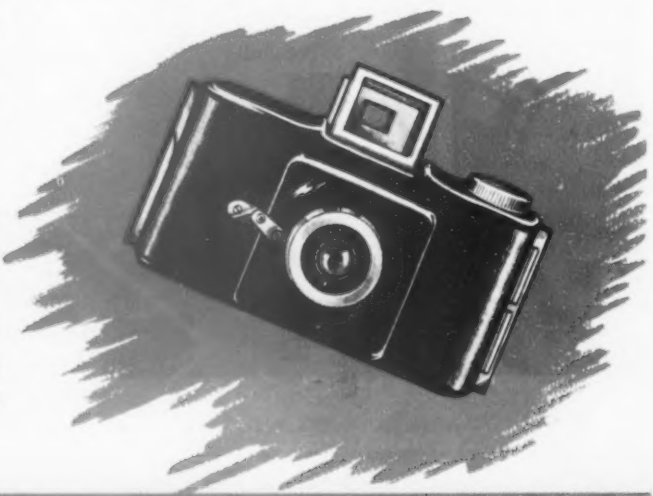
Shown above is the broached drive bushing in actual size.

The line drawing at the right is three times size.

THIS was a job that was labelled "impossible" as a broaching operation. Detroit Broach engineers believed that it could be done . . . the broaches were designed and manufactured . . . and these tools have, for many months, been in constant use for the production of the part illustrated above.

This broached part is the main drive bushing for the shutter mechanism of one of the finest cameras manufactured in this country. In the broaching of the entire contour, all surfaces must blend and be in proper relation to each other. The entire operation is held to extremely close tolerances.

This is only one of many tough broaching problems solved by Detroit Broach engineering ability . . . production facilities . . . and efficient "follow-thru."



DETROIT BROACH COMPANY

20201 SHERWOOD AVENUE • DETROIT, MICHIGAN

(Continued from page 106)

duction runs, it is found less expensive to use several prefabricated sections than to make forging dies and tools to handle the forgings.

Planning plays an important role in material conservation. Select the proper sheet and stock sizes from which the maximum number of parts may be obtained. Not only does this aid conservation, but it also coordinates the flow of work. The planning department may also practice material conservation in man power energy conservation by getting the proper raw stock to the proper machines at the right time, also the right parts to the assembly station when they are needed.

Tooling plays a stellar role in the Douglas Aircraft material conservation program, inasmuch as the tooling of a job may make or break the company doing the work. A part poorly tooled wastes time, energy, and particularly material; therefore, it is essential that the tooling on any part incorporate the most simple, foolproof, quickly operated, convenient, and accurate piece of equipment possible.

A proposed die must be studied carefully before it is designed in order to determine the best possible way to nest the part in order to save material. Many times it is found less expensive to make a double run die to save material than to make a multiple die to make two or more parts on each stroke of the press. The deciding factors are usually found in quantity of run.

Considerable thought must go into

(Continued on page 114)

(Continued from page 106)

rods and a small compartment for used stubs. The slot in this compartment is about two and one-half inches long, limiting the size of stubs that can be inserted. This system has reduced scrap loss in rods by 30 per cent.

An interesting phase of the Westinghouse program is its system of salvage wardens with arm bands, who patrol the shops hunting scrap and promoting full use of materials. Four workers in each section are appointed zone wardens, each man serving a week each month. These men are under the direction of district wardens who meet weekly with a chief warden in charge of all salvage for the plant.

G. E. record impressive

Last year, all Westinghouse plants turned over to scrap dealers 203,000,000 pounds of scrap metal and other materials. Reflecting the success of an intensified program is a 30 per cent increase this year in scrap collected.

The General Electric Company's salvage record is equally impressive. It will recover and return to war production this year 380,000,000 pounds of waste material, according to G. E.'s Salvage Head H. J. Beattie.

Separate from the G. E. salvage department is a group of designing engineers constantly developing ways of reducing the amount of materials necessary in manufacture. Paralleling these efforts is an employe suggestion system for increasing production and conserving materials. The company has paid out approximately $100,000 for more than 10,000 suggestions adopted during 1942.

THE END.

A VITAL MESSAGE TO ENGINEERS ON THE NATION'S INDUSTRIAL FRONT

Complementing The Tool Engineer's review of successful industrial scrap salvage and material conservation programs is this special message from Lessing J. Rosenwald, Director, Conservation, WPB, in Washington.

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TOOL ENGINEER MAGAZINE
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WITH THE OPENING OF A SECOND FRONT IN NORTH AFRICA, THE WAR HAS NOW ENTERED A PHASE THAT DEMANDS AN EVEN GREATER AMOUNT OF EFFORT. THE REQUIREMENTS WHICH THIS CHANGE PUTS UPON WAR INDUSTRIES TO PRODUCE FIGHTING EQUIPMENT MEANS AN UNPRECEDENTED DEMAND FOR MATERIAL . THIS DEMAND CAN BE MET ONLY WHEN EVERY REMAINING RESOURCE IN INDUSTRIAL AND DORMANT SCRAP, OBSOLETE MACHINERY, TOOLS, DIES, JIGS, AND FIXTURES ARE BROUGHT INTO THE STEAM OF WAR PRODUCTION. EVERY MEMBER OF YOUR INDUSTRY, EACH PLANT EXECUTIVE, IS CONFRONTED WITH AN IMPERATIVE APPEAL TO SALVAGE MORE IRON AND STEEL SCRAP, MORE NON-FERROUS METAL SCRAP, MORE RUBBER, MORE COTTON AND WOOL WASTE, MORE OF ALL THE MATERIALS NEEDED TO MAKE FIGHTING TOOLS. THIS CRUCIAL CHALLENGE CAN BE MET IF EVERYONE IN YOUR INDUSTRY WILL EXHAUST THE SCRAP POSSIBILITIES WITHIN HIS REACH. WHAT YOUR INDUSTRY NOW DOES TO SWELL THE FLOW OF CRITICALLY NEEDED SCRAP MATERIALS IS OF VITAL CONCERN ON WINNING THE WAR=

LESSING J ROSENWALD DIRECTOR CONSERVATION DIVISION
WAR PRODUCTION BOARD.

Organized Salvage in the Auto Industry

WALLACE A. SCOTTEN

On this Monthly Scrap Disposal Chart, prepared by the ACWP, more than 350 automotive industry plants are reporting quantities of the various types of metal salvaged and consigned for re-use in the war program.

Studebaker Photo

Automotive Council For War Production executives believe the total tonnage of non-productive metal consigned to scrap piles by the industry has exceeded the best expectations of the government. Here are two auto plant workers checking hundreds of metal stamping dies for salvage.

"SALVAGE FOR VICTORY" is more than patriotic prose in American industry today. It is a must. Mass production engineers fully realize that victory may never be achieved without a practical and comprehensive industrial salvage program on a nation-wide basis.

Industries engaged in the manufacture of one outstanding product, especially where the raw materials used are fairly limited in number, hardly present as varied a background for study of the subject of salvage operations.

Contrasted with such manufacture is that carried on in plants of the automobile industry from which a veritable flood of war products is now rolling. Always active scrap suppliers, these plants are now organized in an industry-wide program of scrap collection and material conservation that is one of the most outstanding on the basis of results in the entire American war production program.

At its present rate of supplying "food" for the furnaces, the motor manufacturers are turning over to the mills sufficient scrap to meet requirements in the production of more than 5,100,000 tons of new steel — about the same quantity of metal used in making automobiles in one of the industry's top years.

Thus, in a period in which peak war production has not yet been reached, this industry believes it has become "self supporting". But because of the seriousness of the scrap situation, auto plant management has gone far beyond its long-standing practice of turning over "production" scrap, and is now digging for every available ounce of "non-production" scrap.

An industry-wide drive, planned by the Automotive Council For War Production, is based on a "use it or scrap it" rule. The extent to which the program has been carried in more than 350 plants is indicated by some non-production items unearthed and sent to the salvage piles.

In one plant, an obsolete incinerator — steel stack and all — was ripped up. One plant salvage authority, noticing that his company's parking lot markers were made of old rails, ordered them dug up. Having enjoyed little use for five years, more than 1,800 tools were pulled down from the shelves in another plant.

Back of this industry-wide program, in which salvage techniques developed by one concern are supplied to others through the offices of the Automotive Council For War Production, is a salvage committee set up by that organization and composed of representatives of management.

Late in the spring this year the committee held its first meeting in Detroit, and suggested the appoint-

The automotive industry, always an active scrap supplier, leads the nation in organized salvage. From more than 300 plants, reports show that collections of both production and non-production scrap have reached new highs.

CONSERVATION THROUGH DESIGN

●

CONSERVATION of materials, especially in the fabricating of tools, should start at the source—at the drawing board. Every designer should possess a clear concept of what is critical in materials, and design accordingly.

Boiler plate, for example, is being strictly allocated, and steel castings are at a premium. But cast iron, which has served for jigs and fixtures for generations, is still available. Well then, use cast iron!

High speed steel is scarce, but cemented carbides are reasonably plentiful and, where they can be used, increase production. Properly "backed" and judiciously "raked", they sometimes perform the impossible. The sensible thing, then, is to employ cemented carbides or their related cutting alloys wherever possible.

High speed steel can also be conserved by "tipping". The brazing of cutting tips to low grade shanks is gaining widespread acceptance. In this regard, one Tool Engineer reports he is making practically all milling cutters, reamers, etc. with brazed blades. The results, he says, have been excellent.

Structures and sections should be designed for maximum strength and minimum material. It can be done. Structural steel is light and strong, but has a tendency to twist and vibrate. Both of these defects can be overcome by careful design.

▼ ▼ ▼

FOR EXAMPLE, a length of 5" I-beam may suffice as far as strength is concerned, but must be rejected because of possible twist. To conserve materials, use two pieces of 5" channel. Weld the flanges together to make a box section, and you have twice the twist resistance with practically the same weight as in an I-beam.

Use commercial drill bushings as far as possible. Where special designs are necessary use machine steel, pack hardened and, of course, ground. For that matter, pack hardened machine steel can replace 50% of the tool steels now used. Here is real material conservation.

Round bar stock comes in even sizes, as 1", 2", 2½", 3" and up (with plenty of intermediates) and square or rectangular bar stock in such sizes as 2" x 2". So does cold rolled steel. In this instance, order finish sizes somewhat below these dimensions, to eliminate or reduce the waste of materials. Rest pads of C.R.S., for instance can be pack hardened and ground to 31/64" from ½" stock, and so on ad infinitum.

Opportunities for material conservation in the design of a tool or finished product are limitless. It is the responsibility of the shop superintendent to collect and segregate scrap. But it is up to the designing engineer to eliminate the need for much of such work by careful material specification and ingenious methods of production.

ment in each automotive plant, as well as in hundreds of automotive parts suppliers plants, of a salvage authority authorized to "tag" for disposal all items he might recognize as dormant.

In September, the committee and directors of the Council made one of the most startling moves in the wartime history of American scrap salvage operations, and recommended to the entire industry the scrapping of tools, dies and fixtures for the manufacture of replacement parts where the demand indicated they were no longer necessary to the maintenance of essential civilian transportation.

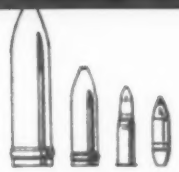
Soon after, newspapers carried WPB Chairman Nelson's order to the industry that if it was "packed in grease" it should be scrapped. Careful checking of facts and figures indicates that the government order, though well intentioned, was ill-advised. The automobile industry had already moved to carry out such a program, within certain boundaries.

As a result of careful planning and continued effort, some 350 manufacturers reported to the Council in a monthly scrap record that 917,337,878 pounds of iron, steel and non-ferrous metals were salvaged in the first four months. Of this total, 100,467,186 pounds were classified in the reports as non-productive. Could the auto manufacturers have reported accurately on this item, the total figure would have been upped tremendously. Necessarily, this figure represents only a small part of the total non-productive scrap unearthed as a number of the largest companies could not record the tonnage of metals they fed back into their own huge furnaces.

●

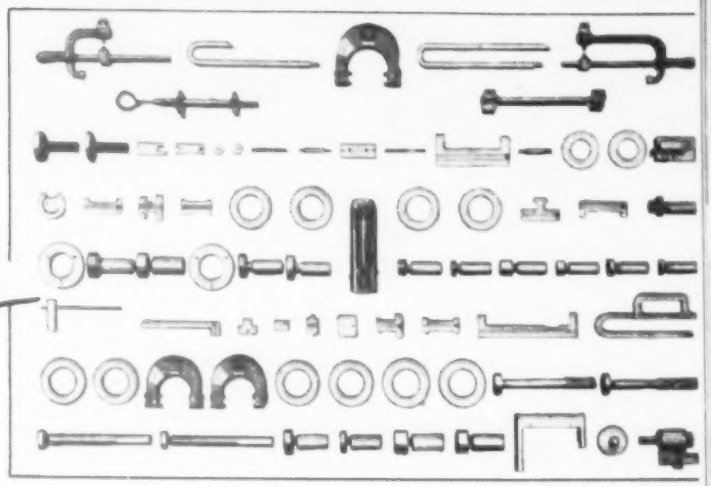
Only time will permit the writing of the entire story of scrap salvage in the auto industry. ACWP executives believe the total tonnage of non-productive metal consigned to scrap piles by the industry has exceeded the best expectations of the government.

As an example, in the first week of one company's participation in the automotive salvage program, a total of 1,156,000 pounds of dormant equipment filling 17 railroad cars was hauled out of its shops to steel mills. In addition, the company authorized one of its suppliers to scrap a collection of tools and dies which, representing an initial investment of about $4,500,000, yielded 2,000 tons of cast iron and 500 tons of steel. THE END.



YOU CAN INSPECT PROJECTILES AND SHELL CASES THIS WAY

Checking each dimension separately and laboriously with its own fixed size gage requires many inspectors and lots of time. This set of gages was used in checking the critical dimensions of a 75 mm. shrapnel body.



But HERE'S A BETTER And A FASTER METHOD

This Multichek gage checks both tolerance limits on eight critical shell dimensions simultaneously—at just one pass and far more accurately than with fixed size gages.

In just one operation this gage checks the overall length of a cartridge case, two body diameters, one flange diameter, one shoulder height, one flange thickness, one counterbore diameter, one counterbore depth, and the primer hole diameter.

Write for a Descriptive Bulletin on the SHEFFIELD MULTICHEK GAGE

THE SHEFFIELD CORPORATION

DAYTON, OHIO, U. S. A.

SHEFFIELD GAGES MASTER GAGEMAKERS

A PROGRAM FOR MATERIAL CONSERVATION

(Continued from page 110)

the design of any tool in order to have the tool work and still make it as simple as possible. Usually, the more complicated a tool, the more material goes into the fabrication. And, of course, the more complicated the tool becomes, the less foolproof it is, and greater are the possibilities of parts spoilage.

Study of conservation has turned up some interesting considerations which may present new light on the subject. Excessive cuts on materials, through poorly or improperly designed tooling, may waste material. When cuts are too heavy, there is an undue amount of friction between the cutting tool and the work and on all of the bearings in the machine tool. The cutting tool itself may be wasted because a hard spot in the metal may break or chip an already overloaded tool. Further, excessive heat tends to draw the hardness from the tool, causing it to become dull more quickly.

Grinding scrap costly

Grinding a lot of material from a piece of stock or part is another way to disregard material savings. Abrasive grit and metal powder mix readily and separation is nearly impossible. Filing falls into the same category.

Recently, a tooling shop wanted to regrind broken milling cutters to a smaller diameter. The War Production Board declared that such a practice should be frowned upon inasmuch as it would waste high speed steel. The logic behind these statements was that if a three and one-half inch cutter was ground down to three inches, nearly one-third of the original cutter metal would be wasted. Their solution to the problem was to have the broken cutters resmelted and remade to size.

This seems like an expensive procedure. However, there are, and will be, many things that we will have to do that normally we would not.

When the problem of material conservation was first attacked in the Douglas Corporation, enough scrap left the "back door" to build one plane for every four ships completed. Today, not only is less scrap produced, but such scrap as is inevitable, is baled and thrown into a smelter and reclaimed in the form of stock-sized material. THE END.

Plastics in War Production

The development of high-impact plastics for use in war work opens the door to the extensive use of plastics as superior materials in peacetime mass production.

CARL H. WHITLOCK
MONSANTO CHEMICAL COMPANY

BEFORE PEARL HARBOR, plastics were called on to replace critical materials in a wide variety of applications new to plastics, but most of these applications were for essential civilian needs.

With the exception of the Navy Department the government was not prepared to consider plastics for defense items — principally because they did not have trained plastics technicians to carry out the essential development work. The Navy Department, however, had specifications covering plastics, and has had a plastics program for years.

There were few defense items in plastics prior to the war. Many items were considered, but due to the lack of technical personnel in government, the suggestions for plastics came from individuals in the plastic industry, who had little experience with implements of war. As a result the majority of items considered proved impractical.

GOVERNMENT DEPARTMENTS are now staffed with competent plastics technicians. The industry has learned from experience many of the requirements of war products. Many war production items are now being manufactured from plastics. Many more are under consideration.

We do not like to refer to plastics as a substitute; although there are a few items being manufactured of plastics which come under this classification. In most instances, the use of plastics has definitely shown improvement over other materials which had been used in the past. In some instances, the demand for new qualities to fill certain application has even resulted in the development of new plastics compounds. For example, the war program has given new emphasis to the need for molding compositions of high impact strength. There are two reasons for this emphasis; namely the need for plastics possessing high impact strength under wide ranges of temperature for severe military and war production applications; also shortages of vital metals.

THERE is little difference between the formulation of a high impact material, and that of the more commonly known molding compounds, except in the type of filler used. Investigation has brought forth the fact that a special twisted cotton cord was the one best suited for use as a filler to produce a material with very high impact strength.

To get a cross-section of the accomplishments of plastics in the war program, let us study four items chosen for specific reasons.

Helmet Liner — An application which could not be made from any other material than plastics and still have the desired mechanical and physical requirements.

M-52 B1 Fuse Detonator — Replacing aluminum with plastics, but proving adequate and resulting in a saving in cost.

Piston Reamer — Replacing tool steel and which has possibilities of opening up a new field for War Production items.

Wheel Tread — An application replacing rubber. Though it meets all mechanical requirements, it will be used only for the duration.

• *The helmet liner* is made from an especially prepared phenol impregnated fabric material. It is extremely strong and light weight. The purpose of the helmet liner is to give a limited amount of protection to the wearer without the steel outer cover. No other material proved as satisfactory.

• *The M-52 B1 Fuse Detonator* had previously been machined from solid aluminum rod. This plastics application was first considered purely from the standpoint of conserving aluminum. This fuse is ideal for plastics, in that it is a part of the trench mortar shell which has a low velocity, and does not require the strength of fuses used in the high velocity shells. In tests on plastic fuse parts, it was found that a medium impact strength molding compound was satisfactory.

Inasmuch as the fuse parts are made complete in the molding operation, quantity production can be obtained from a minimum of equipment, and at a saving in cost over the aluminum fuse parts. The change to plastics has made available machine tools for other purposes.

• *The piston reamer* made partially from plastics was conceived by a large machine tool company in an effort to conserve tool steel, save machine hours in the manufacture of the reamer, and save in the cost of the item. It was not possible for the plastics technician to give any specific data on an application of this kind, other than to pass on to the tool company the physical properties of the molding compounds. Due to the fact that the application of this reamer placed limited strain on the tool, it was decided to make an experimental mold to produce a reamer for experimentation.

The design of the reamer consisted of tool steel segments molded into a plastics hub and extending away from the hub 3/32 or ⅛ inches, to form the cutting edge. The saving of tool steel is tremendous, as the amount of steel involved in the design is only a small part of the total volume of material in the reamer. It is too early in the development to give any conclusive results, yet this application might extend to many types of cutters and reamers.

• *The molded composition wheel tread* was developed to replace a rubber tread. Plastics treads possess many advantages over those of rubber. Most important is that of wear. When this application was tested, it was found that the testing equipment was wholly inadequate to test the wearing qualities of the plastics tread. The first test indicated that the plastics tread was wearing out the testing equipment. We have no figures on the wearing qualities of plastics versus rubber, but it can be concluded that the plastics tread will wear several times as long as the rubber tread.

THE BIGGEST DISADVANTAGE to the plastics tread is its lack of resiliency. It is a great deal noisier than rubber; on the other hand, it is better than a steel tread. This application is for the duration only. It will not be considered when rubber is again plentiful. It must be noted that of these four case histories, only one, the plastics tread, can be considered as a substitute.

The Army Ordnance Department is interested in plastics with high impact strength to replace vital materials used in shell windshields, fuse parts, hand wheels and innumerable other objects.

The use of impact materials by the Navy has been well established. Up to this time their requirements have been confined to materials of the macerated-fabric or cotton-filled types, chiefly because no moldable compositions combine high impact strength with good molding qualities, they can be used to advantage for many parts now made from materials of lower strength.

The general molding characteristics of this new material are similar to those for other impact materials. However, because of the uniformity of the cord, superior molding characteristics have been reported. The low compression ratio, as compared to fabric fillers, allows for ease in charging the mold. Resin segregation is minimized and flow characteristics are improved. Transfer molding of articles requiring high impact strength is facilitated by a cord filler.

Impact strength in transfer molded articles containing macerated fabric are naturally reduced as a result of the breaking down of the filler as it passes through the gates and sprues. The cord filler, being more uniform and having much better characteristics for flowing through the gates without destroying the structure, produces a transfer molded article of excellent strength. THE END.

REVOLUTIONARY WATER-COOLED DIES DEVELOPED

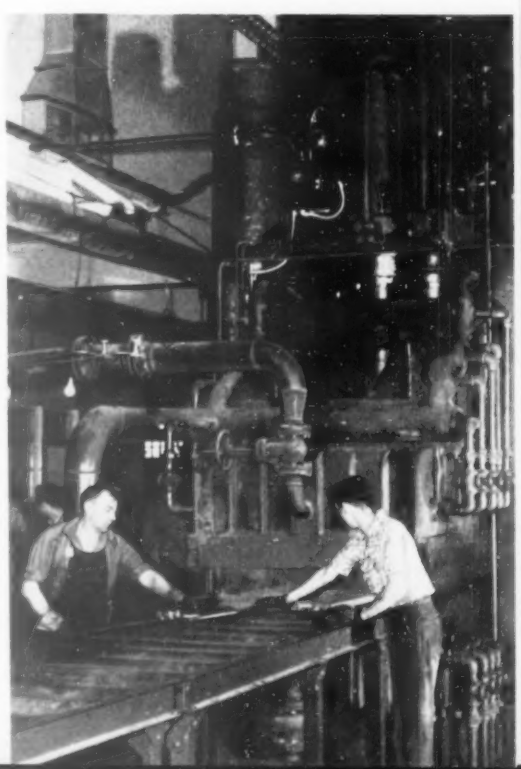
THE MAN CREDITED with building the first moving assembly line, basis of America's industrial might, has added still another to his many startling innovations in the technology of mass production.

Seventy-nine year-old Henry Ford has offered for American war production the secret of a sensational new 2,500-ton press, equipped with water-cooled dies, for simultaneous straightening and cooling of heavy armor plate. The huge machine, completely automatic, was developed and is in operation in the new armor plate factory in the Rouge plant at Dearborn, Michigan.

Substituting water-cooled dies for water tanks, sprays and straightening machines in use in other steel plants, the new method reduces time required for the job from two hours to three to eight minutes. Rapid cooling results in warping of armor plate, hence the necessity of straightening.

From the furnace, the blast-red armor plate is carried by conveyor directly into the press. Conveyors carry the cold, black plate out for annealing to proper toughness.

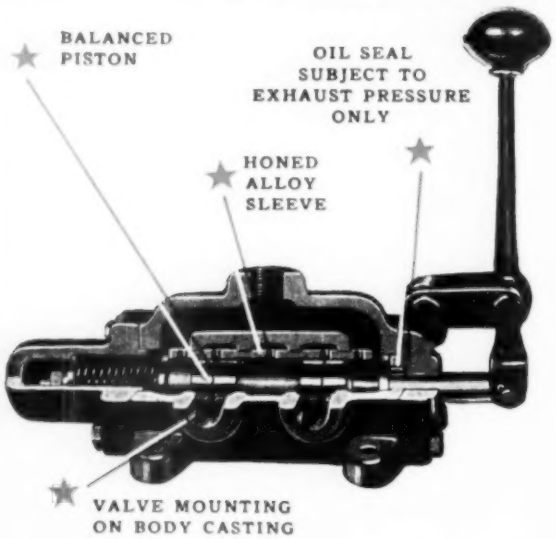
Features which make the dies feasible as water-cooled plate straighteners are two platens, each of which is hollow. Into these are fed cold streams of water during the period of the steel is sandwiched between them.



Armor plate straightening is a mass-production job in this new Ford press.

with

RACINE 4 WAY VALVES



RACINE balanced piston, sleeve type valves embody the latest developments in modern hydraulic design. Their soundly engineered, rugged construction insures positive performance and long trouble free service.

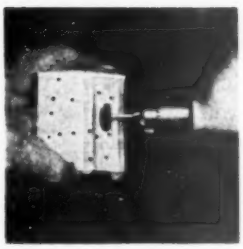
RACINE valves provide for complete hydraulic balancing of all interior moving parts. Honed alloy sleeve supports piston on a continuous bearing surface. Multiple drilled porting holes in the valve sleeve reduces shock by tapering off volume when oil flow direction is changed. Oil seals are subject to exhaust pressures only for longer life and less leakage. Valve mounting feed are part of the main body casting so that gaskets and seals do not absorb pipe line vibrations.

Write for our new catalog P-10-C giving complete details. Our engineers will be glad to work with you and to show how RACINE Variable Volume Pumps and Hydraulic Valves can be readily designed into your equipment.

RACINE TOOL AND MACHINE COMPANY
1777 STATE ST., RACINE, WISCONSIN

WELDON ROBERTS

Brightboy



De-burring and finishing holes and edges in Alclad part with Brightboy Wheel.

Removing heat stain and finishing tube seam with Brightboy Wheel.

A 3-WAY PERFORMANCE

★DE-BURRING ★FINISHING ★POLISHING

with

WELDON ROBERTS

Brightboy

"The Soft Rubber Binder Cushions The Abrasive"

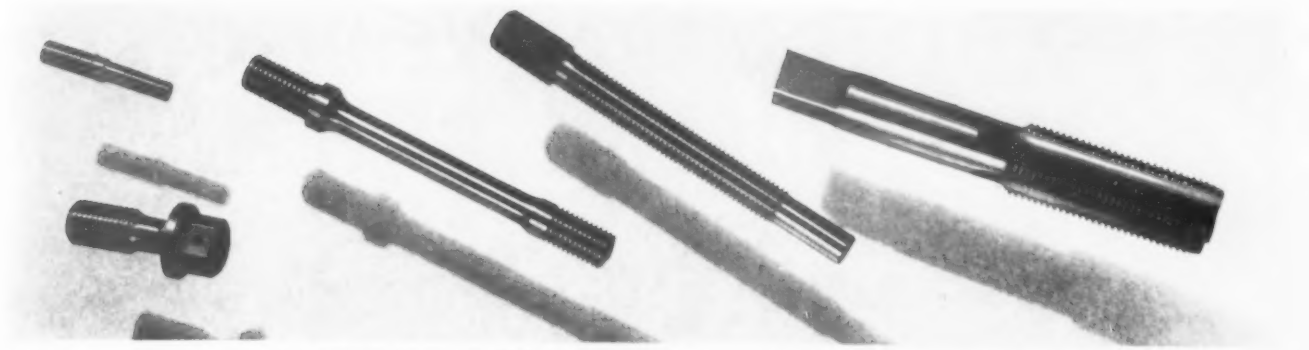
BRIGHTBOY is an outstanding example of how a minimum amount of rubber is put to maximum use, economically effecting substantial time and work savings in America's war industries.

In use, Brightboy's abrasive "recedes" into its rubber binder, producing a unique effect—de-burring, finishing and polishing, and putting on a slight radius, all in one operation. In function, it bridges the gap between a grind and a buff, taking over where grinders leave off. Brightboy sticks, blocks, rods and special shapes have innumerable applications in manual work and drill press jobs. Brightboy is particularly effective in close tolerance work.

Available to war industries through mill supply dealers. Brightboy field men are at your service. Write us for prices, catalog and leaflet on "Methods and Applications" if your dealer cannot give you detailed information.

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
NEWARK, N. J., U. S. A.

1. Removes light digs, tool and heat marks.
2. Cleans welded and soldered joints.
3. Finishes dies.
4. De-burrs light stampings and machined parts.



DALZENS DO MUCH MORE TAKE LESS FLOOR

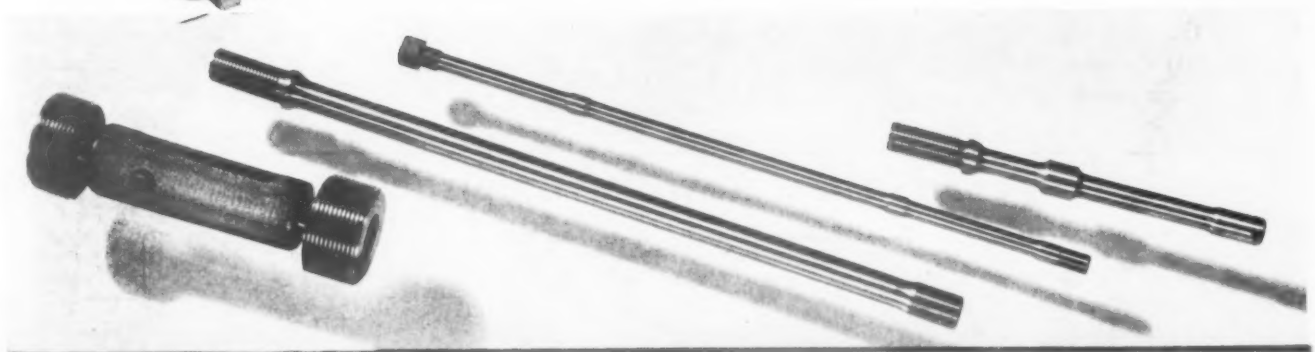
The DALZEN No. 1 will grind threads up to ten inches in length anywhere on an eighteen inch shaft with a diameter maximum of six inches.

No matter how difficult the thread grinding job, a DALZEN Thread Grinder can do it — and do it faster and more accurately. Pictured above and below are just a few of the many thread grinding jobs produced by DALZEN machines.

The vertical design of this thread grinder enables you to save floor space in your factory. This highly productive machine is only 48 inches wide, 38 inches deep, and 75 inches high.

• An outstanding feature of this grinder is the grinding wheel which approaches the work from above. A constant equilibrium is always maintained because the head is in a line directly over its own base. Being in this vertical position, the weight of the wheel head is always down on the feed screw, thus a natural condition for maintaining size of work is assured.

WRITE TODAY FOR DESCRIPTIVE BOOKLET.

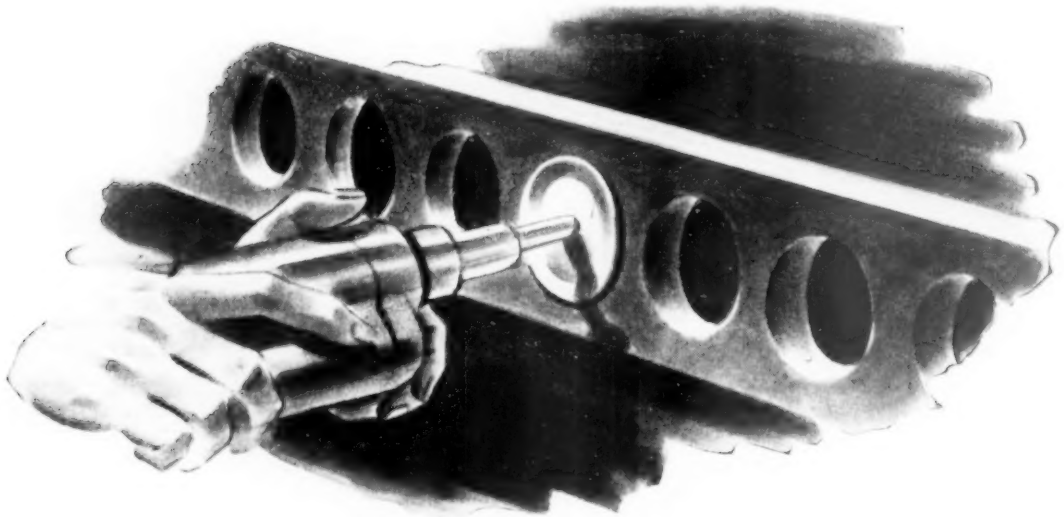


DALZEN TOOL & MFG. CO.

12255 E. 8 Mile Road — Detroit, Mich.

SLOTTED ABRASIVE DISC SPEEDS BURRING OF HOLES

Grinds top and bottom edges of holes to true radius — all in one operation



THE job of removing the burr and producing the true radius required on all holes in aircraft engines has been greatly simplified by the introduction of the slotted abrasive disc. Made of Aloxite Brand Electrocoated Aluminum Oxide Metal Cloth, these discs are being widely used for burring and polishing all metal hole edges, from $\frac{3}{8}$" to $5\frac{1}{2}$" in diameter.

The speedy performance of the disc is a result of the flexibility achieved by its slotted design. Using a disc proportionately larger than the diameter of the hole, mounted on a spindle for use in a portable electric or air-driven tool, the operator presses it against the edge of the hole, as in the diagram below. Accommodating itself to the opening, the disc "cones" backward, sanding only the edge of the hole, leaving the flat surface untouched.

If both ends of the holes are to be finished, two discs mounted back to back are used. They are first pushed through and then pulled back against the opposite edge of the hole.

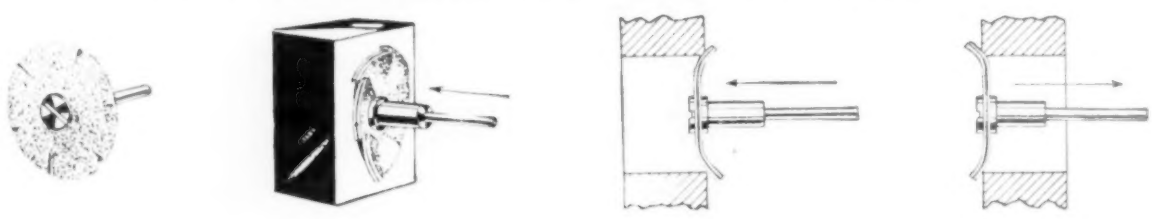
Uses for this new abrasive "Weapon for Production" are many and varied. Such parts as valve rocker arms, connecting-rods, tappet guides, oil holes etc., having openings larger than $\frac{7}{16}$", are typical of its wide application.

In ordering slotted abrasive discs, it is important to select the correct grit for the kind of metal employed and the finish required.

If you care to try a few of these slotted discs we will be glad to send them free of charge. Simply address your request to Dept."T", The Carborundum Company, Niagara Falls, N. Y.

CARBORUNDUM
ABRASIVE PRODUCTS

DIAGRAMS SHOW HOW SLOTTED DISC WORKS



THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum and Aloxite are registered trade-marks of and indicate manufacture by The Carborundum Company)

Sub-Contracting War Work to SMALL SHOPS

Thousands of man-hours of skilled labor and tool room time is still available in small shops. This manufacturer of precision instruments, swamped by war work, developed a successful system of sub-contracting.

I. A. HUNT
FEDERAL PRODUCTS CORPORATION

THIS IS A STORY, in part, of how we got jewelry manufacturers around Providence, Rhode Island, to help us make gages.

Special interest in this story lies in the fact that our sub-contracting consists of letting out a conglamoration of precision gages and parts. It is quite different from subletting one or two items which are to be produced in quantity. And it has to do with getting work into the small shops, a matter of real concern today.

War demands for our regular products, dial indicators and special gages employing dial indicators, have been met in our own shops through the training of new employees.

Our dial indicator gages, however, are a different proposition. Before the war, we showed some thirty or forty dial indicator gages in our catalog. These were of such a type that we could go ahead and stock some against future orders. In addition to these gages, we also made many different types of special dial indicator gages.

We did not look for this special gage business but carried it on as an accommodation to our customers. The reason we did not seek it was because the manufacture of special equipment is more or less a hazardous one. Today we take plenty of it. We are anxious to help.

In addition, we have taken on large quantities of precision parts manufacture. As our own tool shop was comparatively small due to the fact that our dial indicator business was much greater than our gage work, we had to seek outside assistance. We now have some forty plants on our list, of which approximately thirty are constantly working for us. This totals some 3,000 people.

About six of these concerns are continually running out of jobs each week. An average of about two or three new plants, with whom we have not done business before, appear every week looking for work.

This work is of a heterogeneous nature. It involves the many types of catalog gages which can be manufactured under present requirements in quantity lots; it involves numerous types of special gages, many of which bear no similarity to our catalog gages; and it also involves many fixed types of gages and other miscellaneous precision parts, all of which are entirely different from our regular gage work.

How to find subcontractors

When we felt the need for additional assistance we set up a separate department to carry on the executive work. It started with men in our own organization, the same men who were handling our regular sales and engineering work. Our next job was to find subcontractors. Here we followed the same procedure any sales organization would follow in trying to obtain business. The Sales and Engineering Department, not our production department carries on practically all the executive work necessary to handle the job.

We attended W.P.B. clinics; occupying booths as prime contractors. At these booths we displayed our instruments to show the type of work we were looking for assistance on. We did not attempt to go into detail there, but if a concern had equipment which we could use, we gave them a copy of a list of our requirements, and asked them to call at our plant.

It later developed that we were able to work faster and find the plant which was best suited to our requirements by getting them to give us a list of their equipment and the story of what they had been manufacturing, and letting us judge what type of work we should give them.

A major difficulty in sub-contracting is first understanding how extensive and how complete our prospect's experience has been. So, we always ask prospective sub-contractors to give us a list of their equipment, and to give us a history of their experience on the type of work they are used to handling.

I said I would tell how we converted jewelry manufacturers into sub-contractors. Many times we were fooled in thinking a concern was going to be able to help us because they said that they had toolmakers. They were really metal carvers.

Many jewelry shops, however, do have tool rooms and many of them have shown Yankee ingenuity in modifying their machine tools to suit our requirements. Jewelry manufacturers are not the only concerns we have sub-contracted with. They comprise about one-half of the plants.

After it looked as though the shop could handle our work, we gave them an order for the production of parts only; in some cases, complete units.

Whenever possible we furnished a Methods, or instruction sheet of work procedure. A sample was usually provided and the work broken down into its simple elements. Then a pilot shipment of a few finished gages was requested.

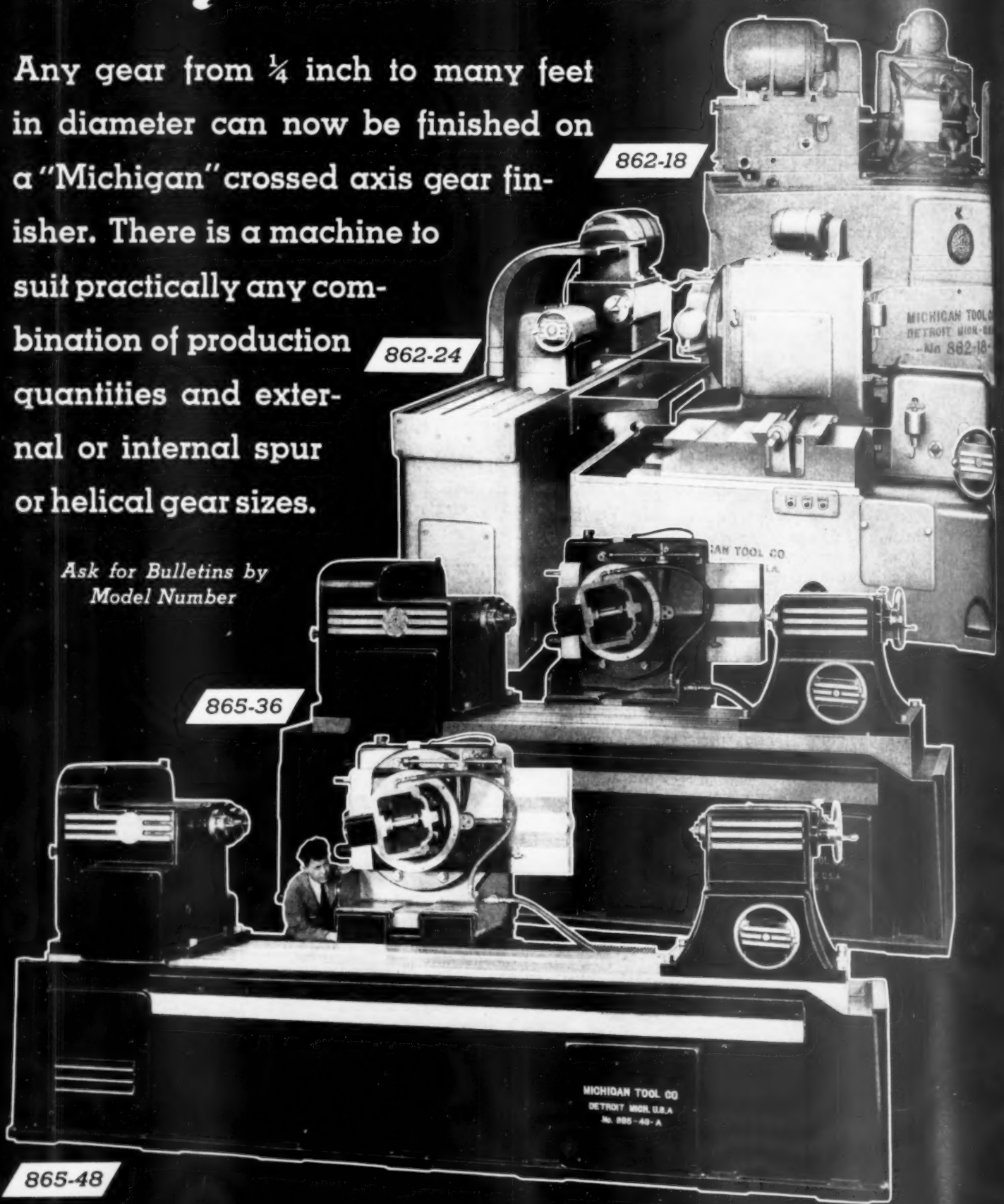
Usually we were able to tell them what the job was worth because of our experience. This enabled us to know better than they did, what they could produce the job for, and in many cases we were able to save them trouble because they were too anxious to get

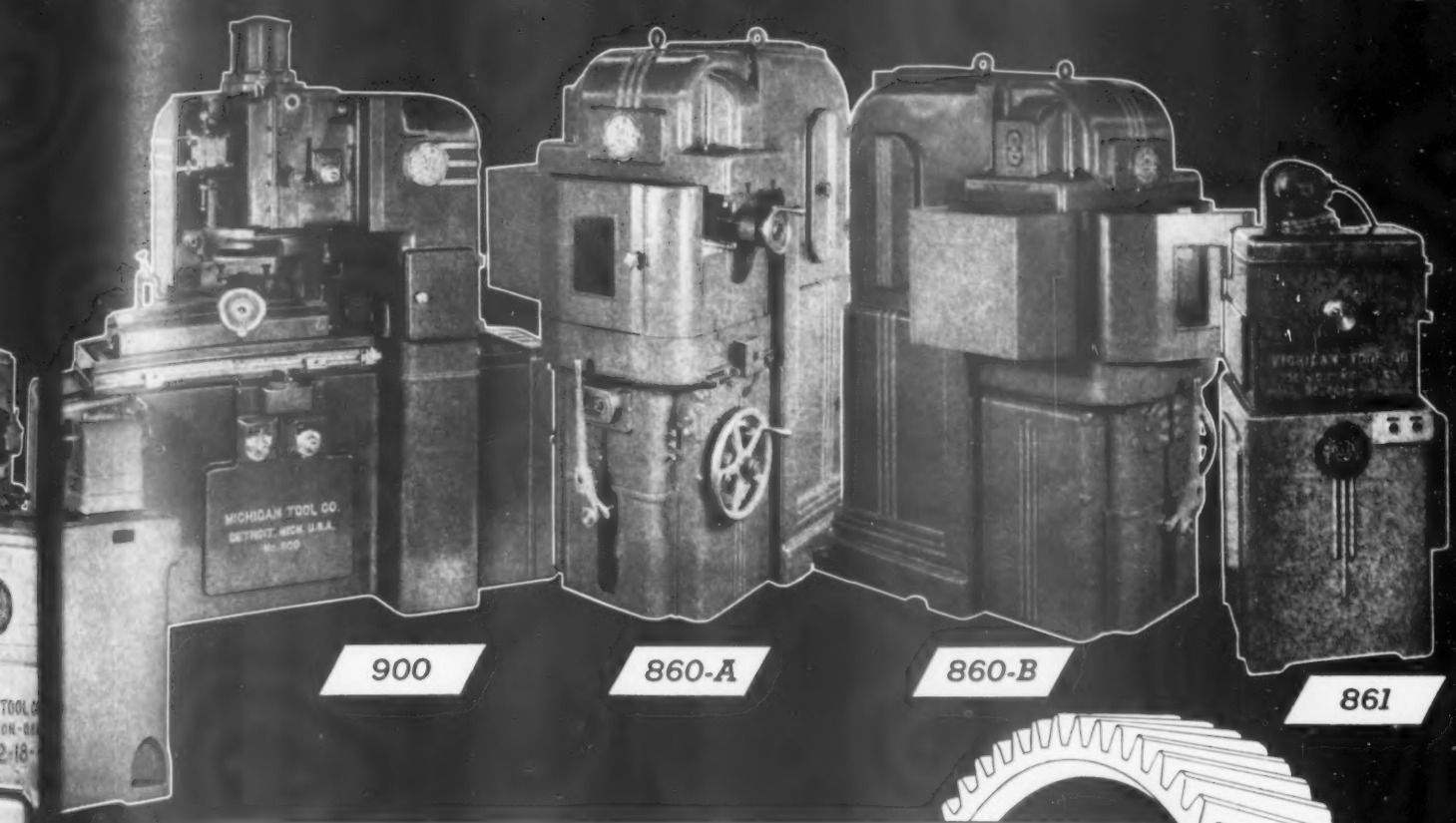
(Continued on page 122)

No gear too large.....
No gear too small...

Any gear from ¼ inch to many feet in diameter can now be finished on a "Michigan" crossed axis gear finisher. There is a machine to suit practically any combination of production quantities and external or internal spur or helical gear sizes.

Ask for Bulletins by Model Number





MACHINE MODEL NO.	GEAR CAPACITY (diameter)
861-4B (Light Duty)	¼" to 4"
900 (Rack Type)	1" to 8"
860-(A or B)-8	1" to 8"
860-(A or B)-12	1" to 12"
860-(A or B)-18	1" to 18"
862-18 (Heavy Duty)	2¼" to 18"
862-24 (Heavy Duty)	2¼" to 24"
865-36 (Heavy Duty)	4" to 36"
865-48 (Heavy Duty)	4" to 48"
865-??? (Heavy Duty)	for larger gear sizes up to 16 feet diameter (on special order)

MICHIGAN TOOL COMPANY

7171 E. McNichols Road Detroit, U.S.A.

(Continued from page 119)

the work and quoted too low. We frankly told them what the job was worth. Experience has shown us that our prices were in line. Concerns whose prices were too high found that they could manufacture properly at the prices we named, and others whose prices were too low thanked us for telling them.

Our own men went into the shops and helped train their workers. Their workmen, in turn, came into our shop and into other sub-contracting shops and observed how we handled the job.

We have given these small plants all possible technical assistance. We were able to tell them the tools to use, the speeds and feeds, the tolerances, what grinding wheels; in fact, all the details which would help them to perform the job satisfactorily. We secured material for them in practically all cases. Many of them, as you know, at the beginning, could not obtain material or machinery because they did not have the war orders, and they couldn't obtain the orders because they didn't have the material or the machinery. Because we had priorities we were able to obtain these materials, and hand them on to the sub-contractor. We were also able to obtain machinery and tools when necessary. We secured money to help finance some. We even loaned them our workmen to help get started.

Follow-up speeds work

All of this, of course, required routine follow-up. At first men within our own organization carried on this work, but as the work piled up we took on other men. One of these men is an ex-school teacher of music, another is a former owner and manager of an automobile agency. Some of these men have worked out better than men who came to us from machinery manufacturers.

It is true that we did not have music teachers giving technical instruction to these sub-contractors; neither did we loan any school teachers to these sub-contractors to help them in their production, but they have been able to carry on the work of following up these concerns, keeping them on their toes, and getting us the information which enabled us to carry on. This information which is mailed to us is transferred to a sub-contractor's weekly report.

From this summary report we are able to tell how much of the sub-contractor's man hours are available. We know his potential weekly hour capacity. And we have an estimate of the number of weeks required to complete our work. A schedule of weekly deliveries is kept which is checked against the sub-contractor's orders.

●

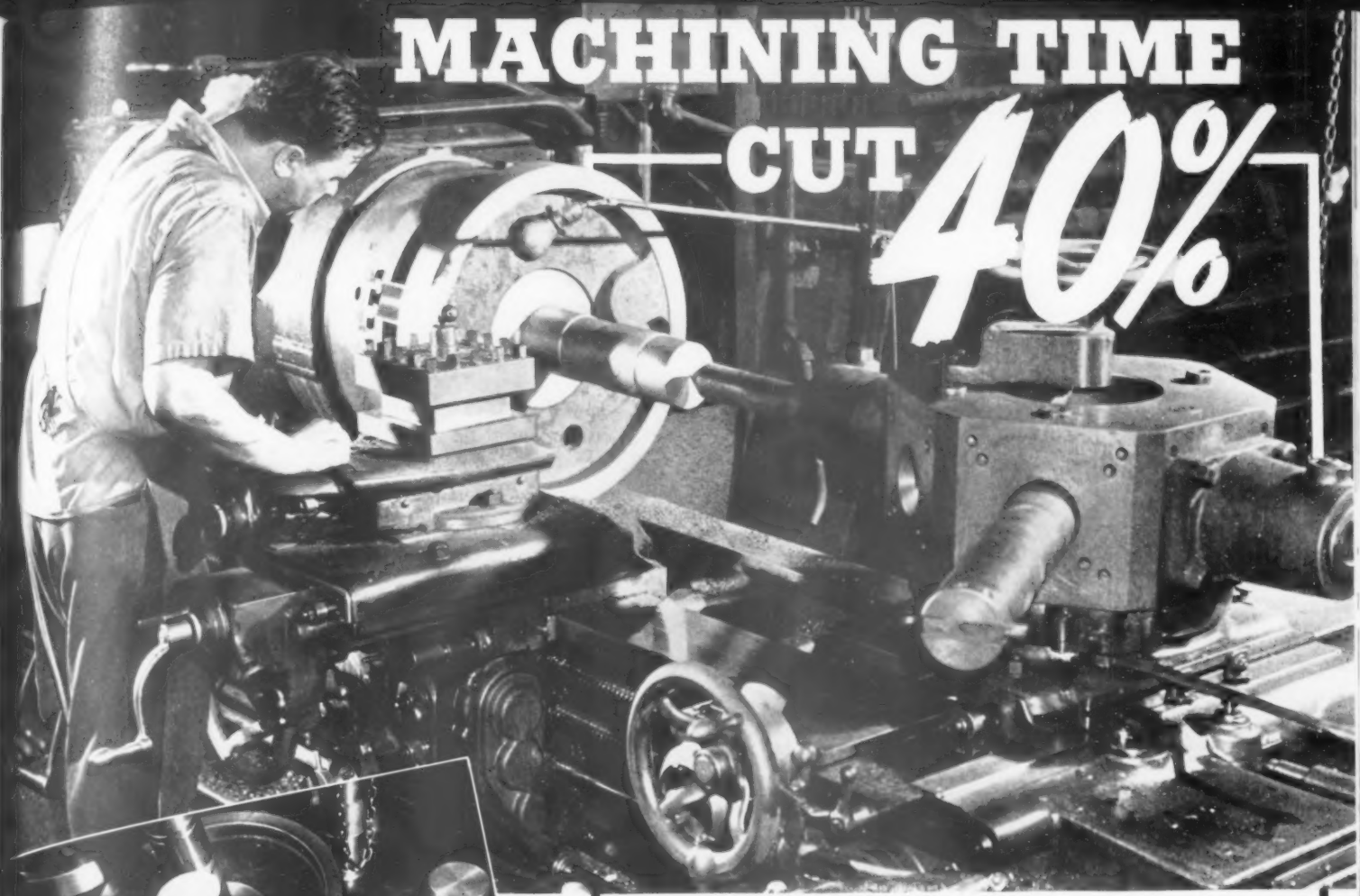
We have applied common sense methods to the job which could have been a messy one to handle. We think that one of the principal reasons we have not gotten into trouble and have been able to handle it with a minimum of supervision — only 4 men — is due to the fact that our records have been extremely simple and because we started in by maintaining control of each job and carefully determining whether the sub-contractor could or would handle the job as we knew it ought to be handled.

Additional man-hours of skillful work are still available if you look for them. Select what is suitable, and cooperate with those you do select.

THE END.

Stuart Oil Products
Commandos of Industry!
Stuart's
Thred Kut
HEAVY DUTY CUTTING OIL
Recommended by America's leading machine tool builders
Stuart's
CODOL
LIQUID GRINDING COMPOUND
Meets every test for the ideal Modern Grinding Compound
Stuart's
"SUPER-KOOL"
AMERICA'S FIRST TRANSPARENT SULPHURIZED CUTTING AND DRAWING OIL
Stuart's
SOLVOL
LIQUID CUTTING COMPOUND
For carbide tools and where an "aquamix" solution is recommended
STUART OILS have led the attack on tough metal working problems for many years. Take advantage of the experience behind them and, without allowing superficialities to interfere, study your cutting fluid applications with the help of Stuart Oil Engineering Service.
Stuart Oil Engineering
Goes with every Barrel
For All Cutting Fluid Problems
D. A. STUART OIL CO.
Chicago, U.S.A. • LIMITED • Est. 1865
Warehouses in All Principal Metal Working Centers

MACHINING TIME CUT 40%



TURNING DATA

MACHINE—Libby 4H Heavy Duty Turret Lathe.

SPECIAL EQUIPMENT—Compound Rest on the Cross Slide and Cross Feeding Hexagon Turret.

WORK—Turning Gate Plate and Gear Units up to 35" O. D.

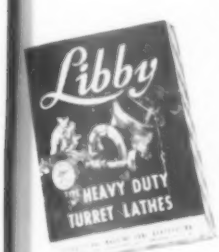
MATERIAL—Cast Iron.

METHOD OF CHUCKING—4-Jaw Chuck.

MACHINING TIME—10 Hours approx.

SAVINGS—Approximately 40% faster than on an engine lathe.

NOTE: This machine is used to handle miscellaneous jobs made possible by the cross feeding hexagon turret which utilizes only simple, standard tools and single point boring bars.



FREE Write for catalog covering the extensive line of Libby Type H Heavy Duty Turret Lathes. Ask Libby engineers to make specific recommendations for your work. Write to Libby Division, 1130 West 21st Street, Indianapolis, Indiana.

...WITH A LIBBY HEAVY DUTY TURRET LATHE

A large Eastern equipment builder now machines gate plate and gear units 40% faster than was formerly possible on an engine lathe.

The large cast-iron parts are chucked in a 4-jaw chuck, and a heavy duty center in the turret is used to support the outer end of the work. The machine is equipped with a compound rest on the cross slide, and performs the miscellaneous turning, facing and grooving operations in about 10 hours, a saving of 40% in time.

This is typical of the way Libby Heavy Duty Turret Lathes are effecting savings and speeding production all over the country. They are greatly improved over machines of only a few years old, and are capable of removing metal up to 50% faster than these older machines. In addition, it is much easier to hold close tolerances on these new machines, even while taking extra heavy cuts.

International engineers are specialists in the machining of large heavy work. They will be glad to check over your present and future requirements, and make recommendations. Your request for their service is without obligation.

INTERNATIONAL MACHINE TOOL CORPORATION

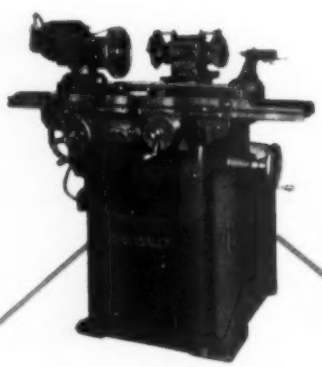
FOSTER DIVISION, ELKHART, INDIANA · LIBBY DIVISION, INDIANAPOLIS, INDIANA

MAIN OFFICE AT ELKHART, INDIANA

FOSTER FASTERMATICS · LIBBY HEAVY DUTY TURRET LATHES · STANDARD TOOLS
SUPERFINISHING MACHINES · BARKER CHUCKS · UNIVERSAL RAM TYPE TURRET LATHES

A Simple Calculation

WILL TELL YOU IF YOU HAVE ENOUGH CUTTER SHARPENING MACHINES



CINCINNATI No. 2
Cutter and Tool Grinder
Catalog M-962 contains complete description and specifications
Write for your copy

● From the broader viewpoint, cutter sharpening equipment occupies an important position in production. True, these machines merely sharpen cutters, but they constitute a link in the supply line that keeps the production line running.

A one-minute calculation will tell you if you have enough cutter sharpening equipment to keep your milling machines in operation: merely work out the ratio between the milling machines and cutter sharpening machines. About 15 to 1 (maximum) is satisfactory for light cuts on conventional metals, about 10 to 1 for general purpose work, and about 5 to 1 for heavy cuts or exceptionally tough materials.

Of course other factors may alter these ratios, but they will serve as a starting point in raising production which may be too low for the number of metal cutting machines at work. Check your cutter grinder equipment at the first opportunity. . . . Don't let a ratio limit your production.

CINCINNATI

THE CINCINNATI MILLING MACHINE CO. CINCINNATI, OHIO, U.S.A.

TOOL ROOM AND MANUFACTURING MILLING MACHINES . . . SURFACE BROACHING MACHINES . . . DIE SINKING MACHINES

PRODUCTION PERSPECTIVES

LAST-MINUTE NEWS REVIEW OF MASS MANUFACTURING

Production: WPB Chairman Nelson says U.S. output has reached four times that at Pearl Harbor time. Lieut. Gen. William S. Knudsen, on constant tour of war plants, says we have reached a production rate equal to 60 percent of next year's goals. Rising totals point to attainment of FDR's 1942 output requests. Last official report cited: Aircraft, up 10 percent; ordnance, up seven percent; a 22 percent gain in shipbuilding for the Navy; cargo ship construction up 10 percent. Federal Reserve Board says total production jumped two percent in September to 185 percent of 1935-39 average, jumped another three points in October. Output has passed $5 billion monthly. Some industries, notably automobiles, have poured out equipment at such a rate that armed force requirements have been met, curtailment has been ordered.

Aircraft: Now getting most production attention. With output nearly on schedule to meet 1942 goal of 60,000 planes, a serious pinch is felt in propellers. General Electric's Charles Wilson, aircraft producers' new boss, plans to double plane output next year.

Production Chief Nelson says: "mass production methods have been greatly improved; many engineering difficulties have been overcome." This reflects under-estimate of U.S. industry's productive capacity, partly explains current slashing of projected plant expansion. Raw materials will be diverted to existing plants.

Small Plants: Long unused, this reservoir of direct-production is now being tapped. WPB's Smaller War Plants Division has placed $25 million worth of business, has another $100 million for possible placement among concerns hard hit for want of war work. Extent of civilian production curtailment and complete conversion to war work in 3,021 manufacturing plants in 74 metal working industries is reflected in the automatic refrigerator business. It now has $800 million in war orders, has past its peak peacetime employment of 36,000 workers.

Machine Tools: Production in September totaled $120,118,000 in dollar volume, compared with $117,343,000 the preceding month. Gain was 2.4 percent. Orders, long in excess of deliveries, caused a rising backlog. Credit to builders is production now exceeding orders. Since plant expansion is being curtailed, downward trend in orders is noticeable. Perishable tools will continue a problem. Younger WPB men want a machine tool freeze, make buyers prove their need, divert steel to guns, tanks, and ships. Washington Whisper: Some tool builders will convert to armament production.

Materials: Less trouble is expected. New allocations plan should eliminate shortages. Strange turn of events is growing feeling that present sky-high steel output will permit a diversion of more metal to civilian needs next year. War-developed Western material sources point to after-war emphasis on manufacture in Pacific coast states....New Kaiser steel mills in California....Nevada's gigantic Basic Magnesium Inc., now producing the precious metal.

Manpower: Authority to control may be delegated before this is read. Voluntary enlistments are more trouble to management than the draft, some plants reporting four enlistments to every draftee. Recent Selective Service Directives offer employers some protection. The Senate's Truman Committee offers longer hours as a manpower solution. Average hours worked in machine tool industry: 50.9 weekly. National average: 43 weekly. Industry wants 48 hours weekly. Marked efficiency lag sets in near 48 hours.

The petticoat cog in the war machine is proving one of the best. Output per woman often exceeds that per man in the majority of metal working industries.

Trends

NOVEMBER MILITARY SUCCESSES in both European and Pacific war theaters were presaged by compilations of September U. S. production figures that showed the nation's industrial machinery is humming a merry song, that long assembly lines are moving unprecedented quantities of war material out of new and "converted" plants.

• •

Major trends noted were two: Lack of criticism of production achievements; the placing of emphasis on airplane and cargo ship construction.

• •

Following a month in which Washington officialdom took the stump to tell production engineers how they should be doing the job, not one outstanding individual raised his voice in criticism.

• •

In Detroit, center for some six per cent of the total war production effort, completion of orders for military vehicles witnessed an actual slowdown in output. Not considerable, but nonetheless worth noting, this recession made it possible for automen to escape labor shortages, swing more men, materials and machines to the building of aircraft, guns and other military items.

• •

Further civilian production pruning was performed by the WPB. Commencement of material allocations under the new Controlled Materials Plan was ample warning to those few manufacturers still struggling to produce "luxury" items that the ghost was up.

• •

Production

IN ANNOUNCING production gains for September of seven to 22 per cent, a much tougher Donald Nelson threw out a few words of compliment, stated that the U. S. is "now producing war goods on a scale which approaches four times the rate at the time of Pearl Harbor." While the production chief appeared to take an optimistic view, he admitted that here and there output was not as good as he wanted it to be.

• •

Especially significant was the fact that output of "miscellaneous munitions" remained steady. This was due to the fact that such goods as motor vehicles, clothing and medical equipment are now tapering off because large supplies have been produced.

• •

Little emphasized in the news, but nevertheless a startling change in war production plans is the contemplated slashing of construction and facilities contracts which still are geared to "absorb between one fifth and one fourth of the total war effort." Less directly essential projects will be "pared drastically." An indication of how voracious direct war demands are is the fact that soaring merchant and naval shipbuilding alone is taking 20 per cent of the nation's mighty steel output.

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Continued on Page 128

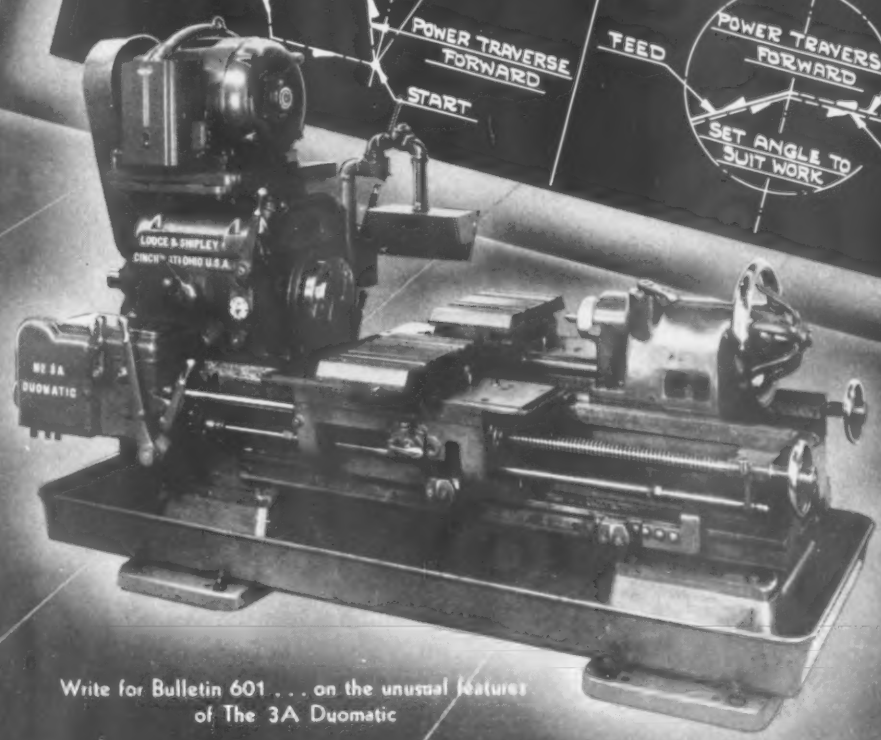
"GREENIE" — *Personnel Problems*

T.M. REG. U.S. PAT. OFF.

GREENIE! WHY ARE YOU WEARING A FUR COAT?
I READ THEY'RE GOING TO FREEZE US ON OUR JOBS!
STOP BEING SILLY! NOW, GET ME A SPLINE GAGE
AS YOU SAY, BOSS
BUY WAR BONDS
SPINE GAGE --- THE BOSS ASKS FOR THE QUEEREST THINGS
SORRY, BOSS — NO SPINE GAGES --- THE BOYS SAY THERE'S A PRIORITY ON 'EM!
HOLY SMOKE! WHY DO THINGS LIKE THIS HAPPEN TO ME?
RALPH DAVIS

AN AUTOMATIC CYCLE for Your Job!

The full range of automatic cycles shown are standard and each cycle is obtainable front or rear. The front and rear cycles can be used simultaneously or independently and require no cams or special attachments.



Awarded Navy "E" March 6, 1942

Write for Bulletin 601 . . . on the unusual features of The 3A Duomatic

THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI, OHIO, U. S. A.

ENGINE TOOL ROOM AUTOMATIC LATHES

(Continued from page 126)

Tools

ESTIMATING that the machine tool industry is currently swamped by a backlog of unfilled orders exceeding $1,000,000,000, the WPB's Tool Division has appealed to the industry to redistribute its nine-month backlog and cut the delivery period by about one-third. To accomplish this task, the government says the producers will have to distribute orders among themselves more evenly. Concerns with high back-logs will have to farm out work to those whose backlogs are smaller. Sub-contracting is necessary on a larger scale, WPB says.

• •

Such a program may not be readily executed. Well known machine tool builders, with deliveries schedued 18 months hence, would have to hand over their own designs to competitors, or even to outsiders who might become competitors. The industry, having already doubled its capacity several times over, is running red hot today and has reason to feel resentment at this government proclamation. To date, WPB is suggesting it be done voluntarily.

• •

American machine tool builders may find considerable after-war competition from the Canadian industry, now booming as never before. Today, fully half of the dominions' machine tool output is sent to American shops.

• •

Producer of the famed Flying Fortress, Boeing Aircraft in Seattle, is currently using more than 100,000 specially designed tools in building the big ship. These tools, all designed by the company, do not include such standard types as electric motors, drills, pneumatic hammers and riveting machines.

• •

Now covering only the Detroit area, the Tooling Advisory Service of the Automotive Council for War Production may soon cover the nation. Plans now being developed call for the delivery of the Council's bulletins each week to tool buyers listing all the tool shops in the country and giving available tooling facilities according to delivery time promised on jigs and fixtures, gages, cutting tools, sheet metal dies and forging dies. The precision rating of shops also will be indicated.

• •

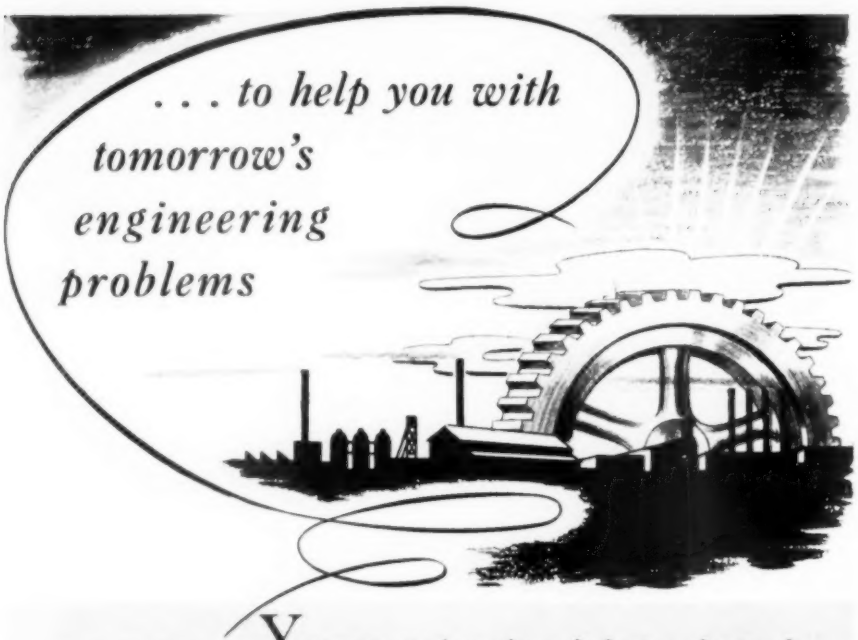
The plan was the result, they say of a serious problem in gage procurement for now rapidly expanding precision production. Considerable enthusiasm has been displayed among buyers concerning the possibilities of industry cooperation through the expanded AWCP plan.

• •

Techniques

PRODUCTION ENGINEERS may soon be receiving helpful suggestions and new techniques from a new WPB department, the Office of Production Research and Development. The office is undertaking to insure the rapid utilization of processes, materials and inventions in war production. Heading the project is Dr. H. N. Davis, president of the Stevens Institute of Technology.

(Continued on page 130)



YESTERDAY American industry dropped what it was doing to take on an entirely new responsibility—the gigantic task of making tools of war—in most cases, an unfamiliar type of production.

Today we see the tangible evidence of America's typical ingenuity and spirit. We are glad to be sharing in this responsibility. Our large staff of over 500 qualified engineers is busy helping industry convert its equipment and facilities from peacetime to war production.

But tomorrow, what? American industry will cease its present production—just as suddenly as it was started—and revert to its former activity. But it will face a different picture.

New needs will have been recognized and improved designs, methods and practices will be born.

To this future day we, like all farsighted manufacturers, are setting our sights.

Faced with engineering problems of most extraordinary character, we have naturally accumulated a great wealth of unparalleled experience, which added to the extensive experience we already possessed, enables us to make an exceptional contribution to industry—now and later.

ENGINEERS
DESIGNERS
CONSULTANTS

PIONEER ENGINEERING AND MANUFACTURING CO.

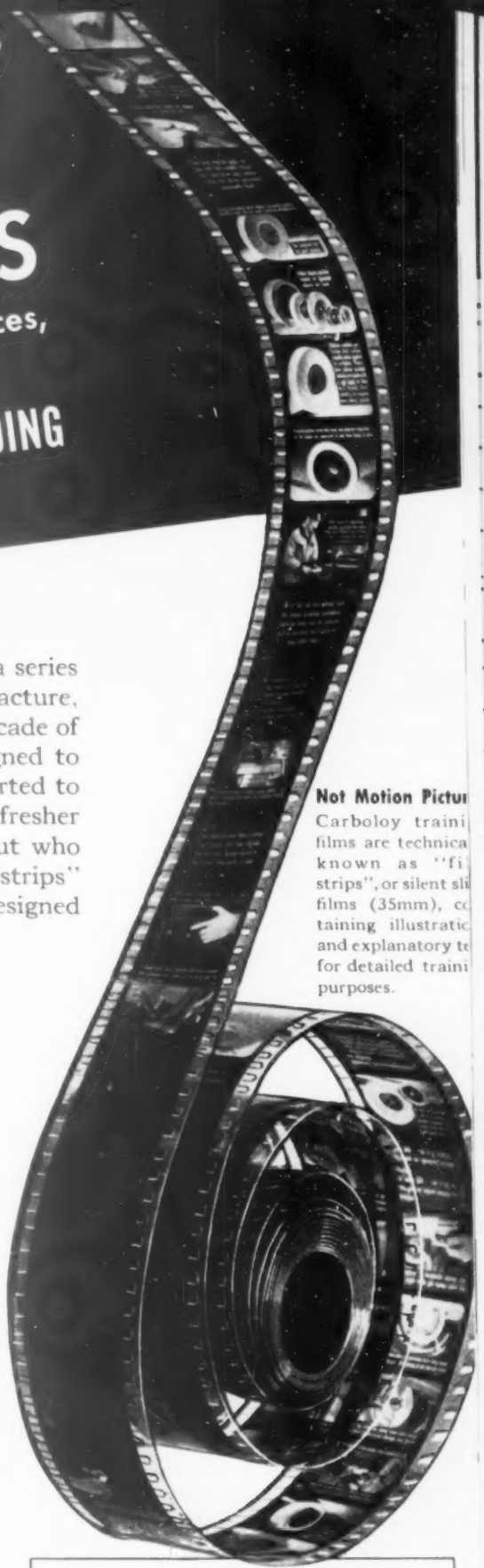
19645 JOHN R.
DETROIT, MICH.

Announcing

A Series of 6 TRAINING FILMS

For your use in the training of new men, apprentices, and personnel being converted to war work

on DESIGN, BRAZING, APPLICATION, GRINDING OF CARBIDE TOOLS



We announce—for use in your plant—a series of six training films covering the fundamentals of carbide tool manufacture, design, brazing, application and grinding. Based on more than a decade of experience in the art of cemented carbide use, the films are designed to speed the training of new men, apprentices, and those being converted to carbide tool use in the metal working industry. Also suitable as "refresher courses" for those with working knowledge of carbide tool use but who wish to review the latest techniques. Technically known as "film strips" —containing illustrations and explanatory text—these films are designed for step-by-step training in the following subjects:

Not Motion Pictu

Carboloy traini films are technica known as "fi strips", or silent sli films (35mm), cc taining illustratic and explanatory te for detailed traini purposes.

SUBJECTS

Film No. 1—"WHAT IS CEMENTED CARBIDE?"

Designed to provide a knowledge of what cemented carbide is, physical characteristics, and how made. Valuable as a basis for understanding reasons for recommendations in subsequent films.

Film No. 2—"DESIGNING CARBOLOY TOOLS"

Reviews for tool designers, the special requirements necessary in designing tools with carbide tips. Covers tool styles, tip and shank sizes, rakes, etc., for single point tools.

Film No. 3—"BRAZING CARBOLOY TOOLS"

Detailed, step-by-step procedure for torch brazing carbide blanks to steel shanks. Includes brazing of single and multiple point tools, how to renew worn-out H.S.S. cutters with carbide tips, etc.

Film No. 4—"CHIP BREAKERS"

Shows how to determine most efficient chip breakers for carbide steel cutting tools; how to adjust to meet individual conditions; and step-by-step procedure for grinding rapidly and accurately.

Film No. 5—"GRINDING CARBOLOY TOOLS"

Step-by-step grinding procedure for single point carbide tools from brazed, damaged and ordinary dulled states. How to rough rapidly and finish accurately. Equipment, wheels, accessories.

Film No. 6—"PUTTING CARBOLOY TOOLS TO WORK"

Important for the operator applying carbide tools. In three parts: Part I—Putting tool on machine. Part II—The machine. Part III—Trouble shooting. What to do when the job doesn't "click".

AVAILABLE FOR PERMANENT USE AT COST OF PRINTS ONLY

So that industrial concerns and educational institutions may incorporate these films as a permanent part of their war training program, prints are available for purchase at approximate print cost of $20.00 for set of 6. (Entire cost of film production has been absorbed by Carboloy Company.) One complete set of six reference manuals and one instructor's manual included.

CARBOLOY COMPANY, INC., DETROIT, MICH.

(Sole makers of the Carboloy brand of cemented carbides)

Chicago · Cleveland · Los Angeles · Newark · Philadelphia · Pittsburgh

MAIL THIS COUPON TODAY!

Carboloy Company, Inc.
11145 E. 8 Mile St., Detroit, Michigan

- ☐ Send free booklet describing Carboloy Training Films.
- ☐ Reserve 1 set of 6 films @ $20.00, including set of film reference manuals and instructor's manual. Order follows.

Name _____ Title _____

Company _____

Company Address _____

City _____ State _____

CARBOLOY TRADEMARK **CEMENTED CARBIDES**

(Continued from page 128)

Calculated to speed production, an agreement between Britain and the United States for a war-time exchange of inventions has been made.

• •

Diamond dust, which has been mixed with oil and tungsten carbide in polishing operations at General Electric Laboratories, is now recovered by a simplified method that calls for heat treatment but requires a fraction of the time formerly used. A small amount of chemicals is necessary. G. E. obtains its diamond dust from worn-out diamond wire drawing dies, which are crushed and sifted.

• •

Sub-contracting has become a production technique. For example, building Consolidated Aircraft's B-24 bomber, with its 315,000 separate parts, now requires the combined services of more than 1,400 manufacturers in 28 states and one Canadian province.

This Booklet WILL TELL YOU HOW..

...YOU CAN MAKE YOUR GAGE BLOCKS LAST LONGER

With the increased use of gage blocks on production lines and the "breaking in" of new men and women on checking operations it is important that they know how to use these standards. The Dearborn Gage Company, Originators of the Chromium Plated Gage Blocks has written this booklet as an aid to those manufacturers who want to keep their standards in perfect condition for more accurate readings. By letting your workmen read this booklet you can increase the life of your gage blocks and at the same time save unnecessary interruptions in production due to imperfect readings. There is no obligation on your part. Merely write us today for the free booklet entitled, "How To Make Your Gage Blocks Last Longer".

DEARBORN GAGE CO. 22037 BEECH STREET DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks

The extent to which powdered metallurgy is being utilized in war production is suggested by the fact that one division of the Chrysler Corporation is currently producing more than 6,000 different units for virtually every known piece of war equipment. These parts, in a wide variety of shapes, weigh as much as 60 pounds. The 40-mm Bofors anti-aircraft gun uses more than 100 of such parts—and more than 200 man-hours are saved in the production of each gun as a result.

• •

Drawings and specifications of foreign-owned patent applications seized by the government's Alien Property Custodian will be printed and made available to American industry. Publication of the printed copies of applications begins this month.

• •

Materials

THE CONTROLLED MATERIALS PLAN method of operation requires a technical study. Purpose of the plan is of more interest to mass production engineers for whom raw materials must be found.

• •

Extent to which the plan will affect industrial operations is indicated by the fact that the WPB is allowing fully eight months in which to put the plan into full operation.

• •

Simple purpose of the CMP is to end over-ordering of already short materials that has thrown war production out of kilter, left some important units without material to operate when other factories had more materials than they could use for months.

• •

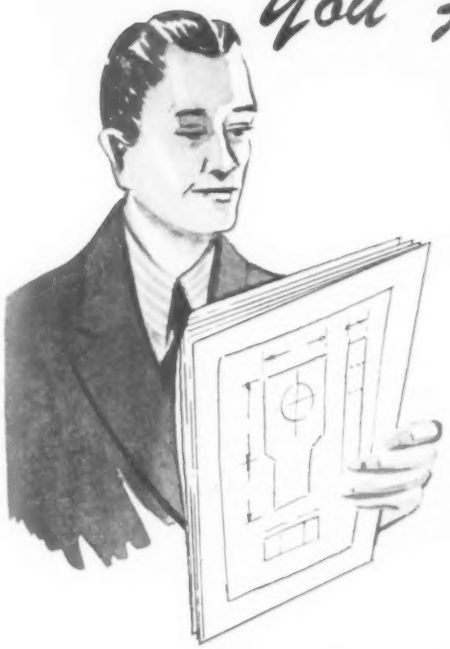
Now the WPB is setting up a bank—stocked with steel, copper and aluminum. These are the critical metals at present, the real bottlenecks. Other materials are short, but WPB believes that if these three are controlled, the other will automatically take care of themselves.

• •

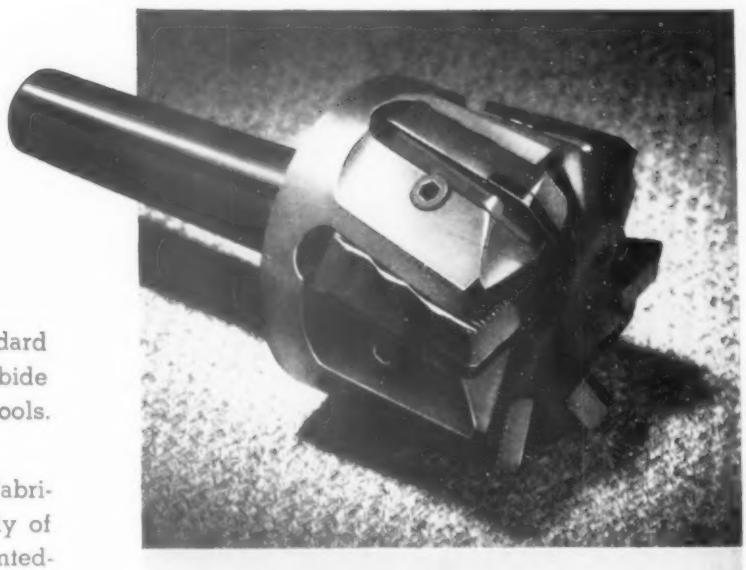
Now, as each government division scheduing war production determines how much metal they will need, they

(Continued on page 132)

You Furnish the Specifications



CARBIDE FABRICATORS WILL SUPPLY ACCURATE, WEAR-RESISTANT CUTTING TOOLS



IN ADDITION to complete lines of standard cemented-carbide tipped tools, Carbide Fabricators produces a wide variety of special tools. The inserted blade reamer illustrated is typical.

In many cases, tools manufactured by Carbide Fabricators have replaced similar tools made entirely of steel. Particularly in high production, these cemented-carbide tipped cutters have provided more than fifty times the wear-resistance of tools previously used—reducing replacement needs proportionately. They have made possible greater and more lasting accuracy, resulting in a minimum of rejects in final inspection.

As in the case of the tool shown at the right, many armament manufacturers are *starting* new jobs with Carbide Fabricators tools. Vital parts go into production with full assurance that they will be turned out with speed and precision.

Special cemented-carbide tipped tools can undoubtedly do a better job in many of your present and future production cutting operations. Carbide Fabricators can provide you with full details and prices on the tools which will meet your requirements. SO THAT WE MAY GIVE YOU FULL INFORMATION WITHOUT DELAY AND UNNECESSARY CORRESPONDENCE, IT IS VERY IMPORTANT THAT YOUR BLUEPRINTS ACCOMPANY EACH INQUIRY.

INSERTED BLADE CEMENTED-CARBIDE TIPPED REAMER

TOOL ILLUSTRATED — Inserted blade cemented-carbide tipped reamer for aircraft manufacture.

DIAMETER — 3⅛".

OPERATION — Boring aluminum casting to depth of approximately 1⅝", and facing bottom.

SPEED — Approximately 500 surface feet per minute.

FEED — .025" per revolution.

Carbide Fabricators Co. ROYAL OAK MICHIGAN

MFRS. OF STANDARD AND SPECIAL CEMENTED CARBIDE TIPPED TOOLS

(Continued from page 130)

will go to the "bank" for material. As Leon Henderson says, no more tickets will be sold than there are seats in the theater. An estimated 70 to 90 per cent of production will come under the controlled materials plan.

• •

Our reserves of raw materials are fully adequate for full military demands and maintenance of civilian economy, says The Commodity Research Bureau, Inc. Facts revealed indicate justification for such a distributing system as the Controlled Materials Plan.

• •

Producers of critical high speed steel may soon enjoy a great piece of luck. A large Canadian deposit of molybdenite has been discovered. The alloying metal is number one on the Dominion's critical list. Hope is to mine over 2,000,000 pounds of the ore annually, roughly six per cent of the world production and enough to supply Canadian mills.

The joint U. S. - British raw materials board recently notified Allied countries that their quarterly allocations of moly must be cut. Mining production, to start in January, should restore at least a portion of this cut.

• •

Manpower

With the national manpower situation admittedly critical, but nonetheless so confused that every "authority" is using a different set of figures, a showdown will come in Washington —possibly before this is printed.

• •

Typical is the situation in Detroit. One week after the WPB announced the motor capital was facing the biggest manpower headache in America, The Automotive Council For War Production revealed that production revisions and material shortages had postponed a labor shortage indefinitely. No manpower control in the area is needed, the automen say.

• •

Traditionally closed to women, Henry Ford's famed 1,200-acre Rouge plant is now employing a rapidly growing number of "Greenies". Pressed for manpower, Ford men have put more than 1,000 to work in the company's glistening new aircraft engine factory at Dearborn, are hiring more daily. Starting at clerical jobs, Ford women are now in painting, heat treating, drafting, metallurgical, chemical and engineering departments. Each passes a physical examination before employment, then receives an aptitude test.

• •

The Labor Department has opened the gates of war plants to girls 16 and 17 years old. Secretary of Labor Perkins, under authority of the Walsh-Healey Public Contracts Act, dropped the age requirements to permit more girls to take their places on war production lines.

• •

Citing terrific man-hour losses, Rear Admiral W. H. P. Blandy, U. S. N., says that since war started, industrial accidents have cost more time "than all our strikes, shortages and transportation difficulties . . . more than 3 billion man-hours—the same productive energy involved in building 100 aircraft carriers."

THE END.

for LESS SCRAP in your plant and more "Scrap" on the fighting front!

Straight Shank Taper Shank

TUNGSTEN CARBIDE tipped standard reamers by Super Tool are the best that money can buy —and the most economical from every point of view.

They cut faster, cleaner, truer. They save time and reduce scrap —hold their size over extremely long runs—give you more production, and speed the stuff out to our fighting men.

Many standard sizes in stock for quick delivery—in semi-finished form for completion to your sizes. Send us your inquiries and ask for Bulletin R-1.

SUPER TOOL CO.

21640 HOOVER RD. • DETROIT, MICH.

CARBIDE TIPPED TOOLS

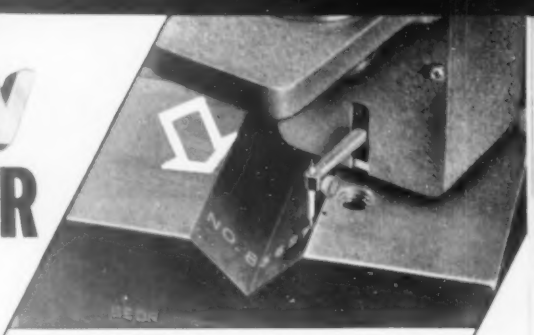
FOR TURNING - FACING - REAMING - SPOTFACING - BROACHING
FORMING - GRINDER RESTS - WEAR PARTS - BORING - MILLING - DRILLING
GROOVING - COUNTERBORING - SHAVING - CENTERS - SPECIAL PURPOSES

HOW THE *New* GORTON SPIT-FIRE ARC ETCHER

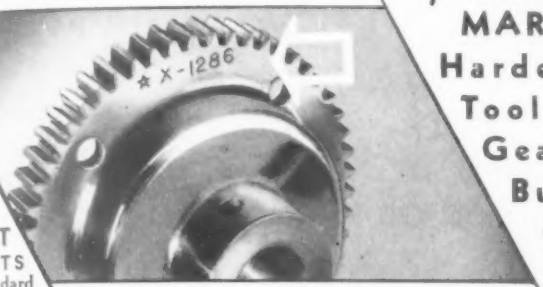
• • • —

Speeds PERMANENT MARKING OF Hardened Parts Tools, Gages Gears, Rods Bushings Collets etc.

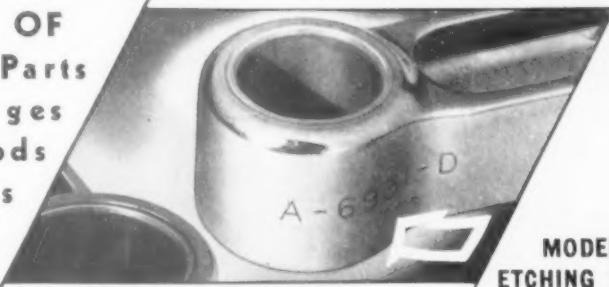
FOR CYLINDERS, etc. — Etching inside cylinders, cavities, cones, etc.



FOR V-BLOCKS, etc.— Etching both sides of a V, and in most inaccessible places.

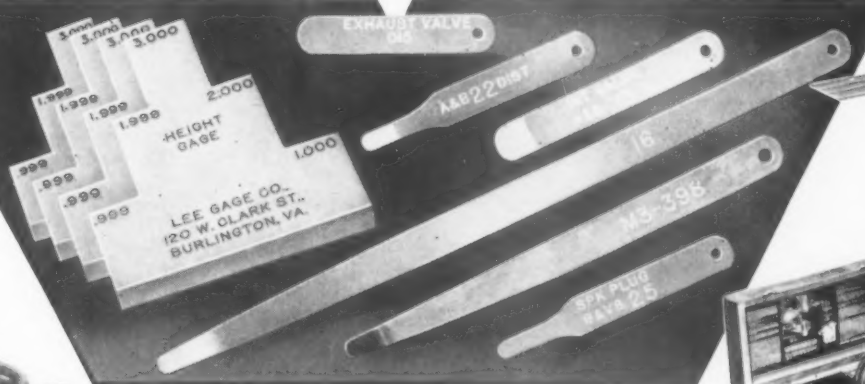


FOR GEARS, etc.— Highly polished or ground parts, hardened pins, etc.



FOR CONNECTING RODS, etc.— Automatically follows curvatures.

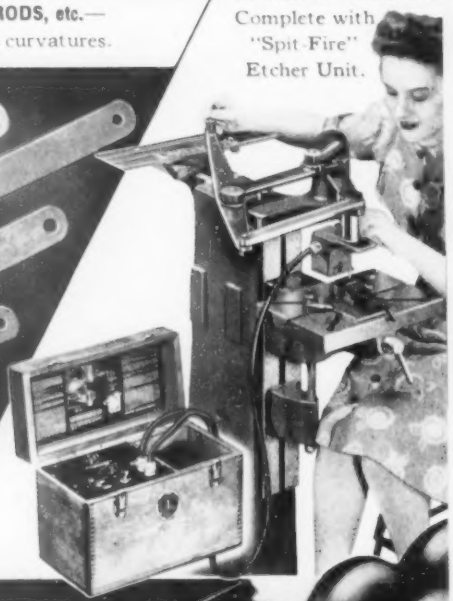
PORTABLE ETCHER UNIT FITS standard Gorton Engraving Machines. For other makes, consult factory, state make.



FOR GAGES — Highly efficient on delicate parts, such as .0015" thin feeler gage stock, and on an endless variety of sizes and shapes.

PRESENT DELIVERIES 2 to 4 WEEKS

MODEL A-E ETCHING MACHINE Complete with "Spit-Fire" Etcher Unit.



Precision Etches
240 BALL SOCKETS EVERY 60 MINUTES

Every 15 seconds the Gorton "Spit-Fire" electrically etches these ball sockets — Accurately . . . Legibly . . . Permanently.

For Accurate
HIGH PRODUCTION ETCHING
Deeply Etches Hardened Parts without Burr

MARKS GOODS IN FINISHED STATE—Most efficient on highly polished or ground surfaces, large or small.

PERMANENTLY ETCHES — LIGHT OR DEEP — from .0001" to .003" deep, and from .0075" to .015" wide, on soft to hard metals, including hardest steels—*Any Shape*, on flat or irregular surfaces — without Forming Guide.

SIMPLE OPERATION—QUICK SET-UPS—Uses unskilled operator. Requires no acid, no pressure. Operates on 110 to 120 volts, 60 cycles AC only.

FOR FULL DETAILS WRITE FOR FREE BULLETIN 1635-A

GEORGE GORTON MACHINE CO.

1322 RACINE STREET, RACINE, WISCONSIN, U.S.A.

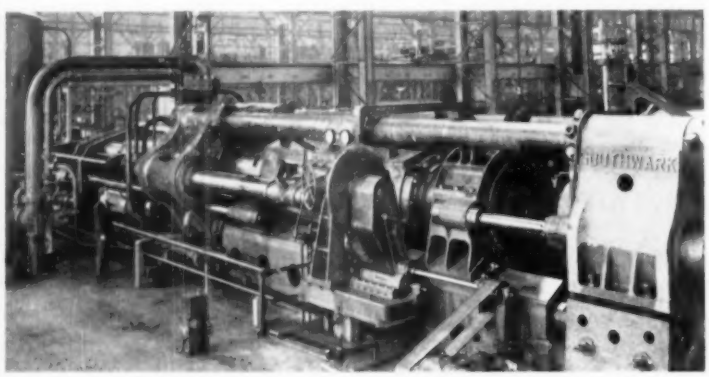
49 Years SPECIALISTS IN ENGRAVING, DIE MAKING AND SUPER-SPEED VERTICAL MILLING

PRODUCTION PIX

WHAT'S DOING IN THE WORLD OF MASS MANUFACTURING

Converted into a tank plant, Ford's famous Highland Park plant is now mass-producing 32-ton all-welded M-4 tanks.

The joint Army-Navy Production Award with Star has been received by the South Bend Lathe Works. The award is their third this year. Previous awards were Navy "E" —Ordnance Award and All-Navy "E".



One of a number of 3,500-ton extrusion presses built by the Baldwin Southwark Division, Baldwin Locomotive Works. For direct and indirect extrusion, the press' main cylinder casting weighs 200,000 pounds, the machine proper 1,000,000 pounds and complete with auxiliaries 1,500,000 pounds.

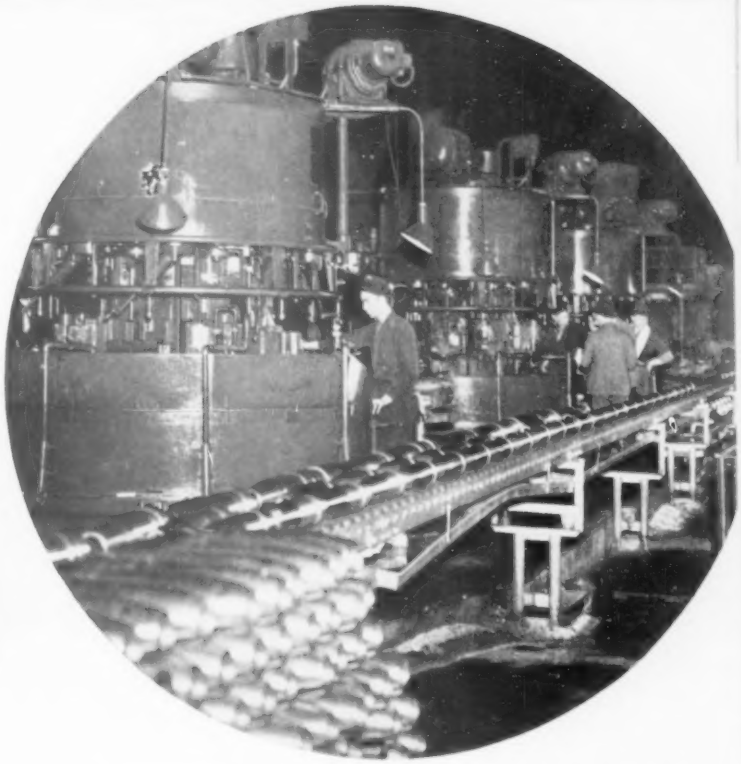
For a production idea in another mass manufacturing industry, B. F. Goodrich Co., Akron, Paul Eckler, a rubber matting pressman, received $400. Making the award are B. E. Seaver, Carl Barnes and A. L. Hardesty.

Left:
Mass manufacture of breech housing mechanisms for Naval anti-aircraft guns at a General Motors Fisher Body Division plant. Excellent production for 18 months was rewarded by the auto industry's first two-star burgee.

Right:
Recent shipment of the 1,000th Jones & Lamson Automatic Thread Grinder marked a milestone in machine tool history. *Left to right:* R. E. Flanders; E. V. Flanders; L. Davis; and W. Grim.

The Sheffield Corporation and the gage industry were paid a high compliment for their indispensability in war production by Brig-Gen. Benedict Crowell when Sheffield received the Army-Navy Production Award recently. Louis Polk, president of Sheffield, is making a speech of acceptance.

Carmen Dozier, *right*, war plant worker at Lodge & Shipley Machine Tool Co., Cincinnati, collaborated with Band Leader Deke Moffett in writing the popular hit, *"Mr. Jap."* Girl is Georgia Gray, singer.



A conveyor-laden stream of shell cases in the plant of the National Tube Co., one of many U. S. Steel units on a 24-hour war production schedule.

Right: Attractive Constance Walker, 23-year-old Douglas Aircraft Co. worker is believed the first woman tool designer in the aircraft industry. Like thousands of other women she is doing a man-sized job; is now training other women in tool design.

•

Men at machines rub shoulders with movie stars today. Ginger Rogers, *at speaker's left*, was a recent war bond rally guest at AT & SF Railroad shops, Albuquerque, New Mexico.

PRODUCTION CITATIONS:
ARMY-NAVY "E" AWARDS

ATLAS PRESS COMPANY, Kalamazoo, Michigan
CENTURY MACHINE COMPANY, Cincinnati, Ohio
E. H. TITCHENER & COMPANY, Binghamton, N. Y.
FEDERAL PRODUCTS CORP., Providence, R. I.
F. L. JACOBS CO., Main Plant, Detroit, Mich.
GENERAL MOTORS CORP., Plants A & D, New Departure Division, Bristol & Meriden, Conn.
HEINTZ MANUFACTURING COMPANY, Philadelphia, Pa.
HENRY DISSTON & SONS, INC., Philadelphia, Pa.
HIGH STANDARD MANUFACTURING COMPANY, New Haven, Conn.
INGERSOLL RAND COMPANY, Painted Post, N. Y.
LINCOLN PARK TOOL & GAGE COMPANY, Lincoln Park, Mich.
LIPE ROLLWAY CORPORATION, Syracuse, N.Y.
OWATONNA TOOL COMPANY, Owatonna, Minn.
PRATT & WHITNEY DIVISION NILES-BEMENT-POND COMPANY, West Hartford, Conn.
SCHAUER MACHINE COMPANY, Cincinnati, Ohio
SOUTH BEND LATHE WORKS, South Bend, Indiana
STANDARD GAGE COMPANY, INC., Poughkeepsie, N.Y.
SUNNEN PRODUCTS COMPANY, St. Louis, Mo.

"YOU'RE RIGHT, I *AM* PROUD OF OUR ARMY-NAVY "E" AWARD

". . . Who wouldn't get a lift from the fact that the Army and Navy have told us that we've been doing a better than average job?

"But there are other things — things that probably have contributed to this award — that make me feel pretty good, too. I've seen every man and woman in this gage plant working, not with the idea of recognition in mind, but just to help win this war.

"I've had a part in the development of new ideas in gage-making . . . using Carboloy and chrome plate in ways that never were thought of before . . . providing much longer life, more lasting accuracy and far greater inspection usefulness in products such as we manufacture. And I know, too, that these ideas have helped to save steel . . . to increase gage manufacturing capacity . . . and to cut down on rejections of important and expensive armament parts in final inspection. These things prove to me that we've been doing what other good gage-makers around the country have been doing — working harder to do something that will contribute just a little more in this War Effort.

"And let me tell you this. The flag over our plant and these pins on our lapels mean more to us than recognition for the job we've done. They mean that we have what it takes to do *much more* than we've done. Speaking for the gang at Lincoln Park, we'll be really in high gear from here on in."

LINCOLN PARK TOOL and GAGE CO.
LINCOLN PARK, MICHIGAN

CAPITAL COMMUNIQUÉ

JAY A. BONWIT

Washington Correspondent for THE TOOL ENGINEER

Eberstadt launches intensive educational campaign to put Controlled Materials Plan into effect. New bill hits at dual control of materials and orders. George H. Johnson appointed new WPB Tools Division Director.

WAR PRODUCTION BOARD Vice-Chairman Ferdinand Eberstadt is directing one of the most intensive educational campaigns yet organized to put the Controlled Materials Plan into effect. It is generally believed that there is not much time—that the plan must take hold quickly.

While priorities developed by a slow evolutionary process, and could have been made to operate, even though ineffectively, CMP—because of the very nature of its structure—must click. It is based on an accurate balancing of supply and demand.

In effect, the plan places allocations on a contract basis for those integrated war production industries that are applying an assembly line technique to their output.

CMP is geared to mass production and the vertical operation of industry. It is an outgrowth of practices developed in the automotive industry, where accurate bills of materials have been prepared for many years.

★ ★ ★

THERE ARE THREE simple steps to CMP. First, a Bill of Materials must be arrived at for all repetitive items that lend themselves to such development. Second, decision must be reached as to how many items will be required, and how many can be produced from the materials available for the purpose. And finally, when a program of production is approved, producers of materials must gear their output to the shapes and sizes required by the fabricators to turn out the approved items.

This plan calls for the long-range scheduling of needs by the purchaser, and in a war economy the purchaser is the Government.

Beyond the fact that the controlled materials—copper, steel and aluminum—will be allocated, priorities will still apply to non-controlled materials.

First industries to be brought under the contract allocation plan will be those which are thoroughly grounded in developing bills of materials.

As usual, there are those in Washington who are standing on the sidelines and scoffing that CMP will not work—that it is too complicated. On the other hand, Eberstadt says that if CMP is not the final plan, it is close to it—meaning that there is no longer time to experiment; that there are imperfections in CMP, but that these will have to be corrected, not scrapped for some other control plan.

★ ★ ★

ADVOCATES of War Production Board reorganization — supporters of the bill under consideration by Congress, which would set up an Office of War Mobilization—base their argument on the need for civilian Government exercising the contract function as well as material flow and scheduling.

These critics blame production and allocations difficulties on the fact that while WPB controls materials, the military services place the contracts, and manufacturers are prone to listen to the source of orders. This condition, it is claimed, creates dual authority and confusion.

(Continued on following page)

THE BUSINESS WAY

● TOUGH, business-wise William M. Jeffers, rubber administrator, knows how to cut government red tape. He had promised Russia he would send it tire making equipment. Knowing Henry Ford's ultra-modern tire factory was idle, he picked up the phone, called the 79-year-old industrial wizard. Take the plant if you need it, said Ford. Dismantling started the next day. Price negotiations will come later.

(Continued from page 137)

WPB Chairman Donald Nelson answers his critics by pointing to the fact that war plants have equipped a considerable Army and Navy, including our North African invasion Army, and have in addition supplied the United States with a large store of arms and equipment. The production totals are not inconsiderable, though little can be said as to the exact volume. In any event, production is not in the muddle that some quarters have alleged.

★ ★ ★

FURTHER EFFORT is being made to achieve subcontracting. The Smaller War Plants Corporation has been dormant for some time. Its activities and accomplishments have been negligible.

Lou Holland, WPB Vice Chairman and director of the Smaller War Plants Division, is making a last effort at forcing subcontracting. He claims that between 10 and 15 percent of the war contracts would keep busy all of the smaller plants which are fitted for war work.

Holland calls on plants to contact his field offices, and report their idle facilities. He indicates that from his end he will try to see to it that contracts will be made available.

Difficulty is that the armed services and other Government procurement agencies have been reluctant to experiment with small plants. They are strictly controlled as to the amount of materials they may have, and they do not want to gamble on whether they will receive delivery.

•

Office of Price Administration has reached an agreement with the military services as to policy on military items not now under price ceilings.

OPA will observe a hands-off policy. The military services objected to OPA interference on special design military items. Rigid ceilings obstructed delivery. On the other hand, OPA maintained that a lack of control over prices would prove inflationary—especially if wages remained uncontrolled. The ceiling on wages removed OPA's objections, and cleared the way for an agreement. OPA will keep its hands off, but will keep an eye on price trends. If prices get out of line, OPA reserves the right to step back into the picture.

★ ★ ★

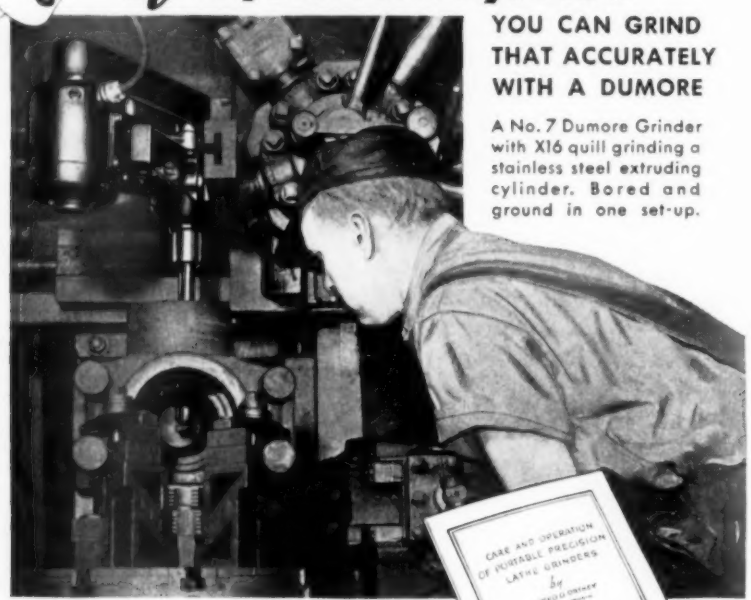
RECENT ACTIONS OF SIGNIFICANCE TO THE MACHINE TOOL INDUSTRY FOLLOW:

• *October 23*—WPB issued Limitation Order L-211, establishing National Emergency Specifications for steel products. The Order establishes the authority for issuing schedules for various steel products, which limit varieties and shapes as well as set up specifications defining compositions, types, grades and qualities of steel and steel products. Action is in line with WPB policy of converting all steel products to the lowest alloy composition consistent with safety and utility.

• *October 30* — Companion actions taken that affected both iron and steel warehouses and brass mill and wire mill warehouses, instructing the warehouses to accept no orders on less than AA-5 ratings. Excepted, in the case of the iron and steel action, are alloy iron and alloy steel for essential

(Continued on page 140)

1/28 the thickness of a Human Hair



YOU CAN GRIND THAT ACCURATELY WITH A DUMORE

A No. 7 Dumore Grinder with X16 quill grinding a stainless steel extruding cylinder. Bored and ground in one set-up.

WRITE FOR THIS HELPFUL INSTRUCTION BOOK ON PRECISION GRINDING

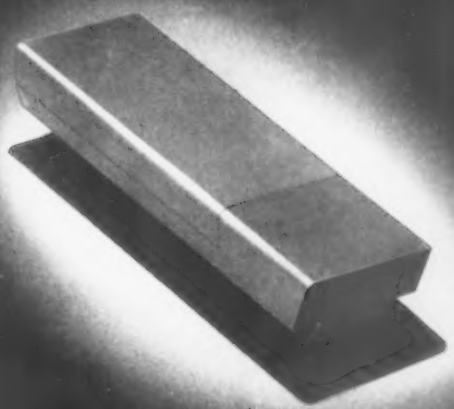
Maintenance of tools is a vital wartime necessity. For this reason, the Dumore Company now offers this practical handbook FREE if requested on your company letterhead. Regularly priced at 25 cents.

For superior military machines, and the tools it takes to make them, use Dumore Grinders on your lathes, planers, milling machines, and other important machine tools. When you can grind to .0001 of an inch . . . within 1/28 the thickness of a human hair . . . that's precision production. Dumore Grinders do more than that . . . they save man hours, material . . . even lives . . . by stepping up production schedules, reducing spoilage, turning out better work, more work in less time. Dumore Grinders also are noted for their versatility . . . they can be mounted in so many ways, so quickly, easily. What's more, they can handle a job from start to finish . . . from the first rough cut to the final finishing operation. Let Dumore engineers help you solve your war production problems, increase the productive capacity and efficiency of your present machines. . . . *SEE A DUMORE DISTRIBUTOR OR WRITE.*

THE DUMORE COMPANY 222-M Racine, Wis.

Dumore PRECISION Grinders

Conserving High Speed Steel.....



. . . it's an old story at Genesee

Long before limitations were placed on the use of High Speed Steel (18-4-1), the makers of "Tomahawk" tools were already regularly producing cutting tools made up of H.S.S. tips on soft steel shanks.

Such "Tomahawk" tools were being used in regular production by one of the largest automobile manufacturers, for instance, as far back as 1938.

Production quantities were not large —in those days there was no tungsten shortage—but it did provide Genesee with the essential production background to produce such tools when suddenly needed in quantities.

That has been and will continue to be one of Genesee's policies:— to be ready with new forms of "Tomahawk" quality tools, standard or special, for any set of conditions, — for war or for the peace to follow.

We will be glad to send you a condensed catalog of "Tomahawk" tools, streamlined to present conditions. Ask for Catalog No. GT-42-1A.

GENESEE TOOL COMPANY

FENTON, MICHIGAN

★ Registered Trade Mark

(Continued from page 138)

repair and maintenance, which can be delivered on A-1-k or higher rated orders.

• *October 30*—Pending issuance of a new order to control magnesium distribution, WPB extended M-2-b, due to expire October 31, until the end of the year.

• *October 31*—Announcement was made of the resignation of George C. Brainard as Director of the WPB Tools Division, and of the appointment of George H. Johnson, president of the Gisholt Machine Company, of Madison, Wis., as the new Director. Announcement was also made of the appointment of John Chafee, formerly vice president of Brown and Sharpe Company, of Providence, R. I., as Deputy Director of the Tools Division.

• *October 31*—In order to provide time to set up scheduling procedures, the effective date of scheduling production and delivery under the thermoplastics order—M-154—was postponed until January 1.

• *November 2*—Tools Division Director Brainard urged machine tool producers to cut their over-all production time by about one-third, and called for additional subcontracting as a means of expediting output. The statement pointed out that concerns with high backlogs will have to farm out work to producers with smaller backlogs.

• *November 4*—Dealers in second-hand machine tools or parts, other than those selling at retail, were licensed under terms of a provision incorporated into Revised Price Schedule No. 1, Second-Hand Machine Tools and Maximum Price Regulation No. *136*—Machines and Parts and Machinery Services.

• *November 6* — Amendment No. 3 to General Preference Order E-1-b issued, instructing machine tool manufacturers to give special emphasis to aircraft requirements and issuing new scheduling directions for deliveries for the armed services. Two categories of "service" purchasers are set up, with Type 1 to be given preference in delivery of machine tools. Without affecting the 75-25 ratio of deliveries, the new amendment increases deliveries to the Air Services. Preference in delivery will be established by following the urgency listings of the Master Preference List.

• *November 12*—WPB placed industrial diamonds under strict control in Amendment No. 2 to General Preference Order M-109, prohibiting the sale, delivery or acceptance of rough diamonds to fill an order of less than A-1-j. While there is no acute shortage of industrial diamonds, the action was taken to prevent leakage into unfriendly hands, speculative buying and other traffic.

• *November 13*—OPA issued warning to sellers of second-hand machine tools, second-hand machines, or parts, declaring that those who have not yet registered should do so before a penalty for late registrations is imposed.

• *November 18*—Supplementary Order M-*21*-d was amended requiring an AA-5 rating for delivery or use of corrosion and heat resistant chrome steel. It was indicated that users will have a better opportunity to obtain supplies on the higher rating.

THE END

Have You a Problem in Industrial Engineering ?

Plant Conversion
Increasing Production
Cost Estimates

Designing Jigs, Tools, Fixtures, Gages, Dies, and Special Machines
Process Engineering

Consultants in Plastics and Tooling

•

If you are in the meshes of production problems that come under any of the above classifications, there's a quick way out. Do as other leading manufacturers in the war industry are doing, and turn the problems over to us. With a staff of over 150 industrial engineers, each with a wide experience in his particular field, we offer you a specialized service that will help you greatly in expediting production.

•

WRITE for quotation on the type of services in which you are interested. No job too large or too small.

ADECO American ADECO
Designing & Engineering Co.
1209 WASHINGTON BOULEVARD DETROIT, MICHIGAN

Boring Bars

with FABRICATED STELLITE WEAR STRIPS

FOR ALL MACHINES

Where accuracy is essential micrometer adjustment in boring bars sets the pace.

Today Scully-Jones is meeting the demands of Aircraft and Automotive Industries with tools for applications where precision is the important factor. Illustrated are a few of the many bars built by Scully-Jones for use in the nation's key war plants. These bars can be made with High Speed Steel, Stellite or Tungsten Carbide tool bits.

For a long service life Stellite wear strips are furnished on boring bars because of their high resistance to abrasion and heat. The set screw method of holding permits replacement as well as diameter change by shimming.

SCULLY-JONES & CO.
1901 SOUTH ROCKWELL STREET
CHICAGO·ILL·U·S·A

"TOOLS ARE INDUSTRY'S GUNS"

Keep 'em firing!

We should say, "Keep 'em working!" They are as vital to the war effort as the guns on the front lines. With the nation at war, *time* and *tools* must be conserved. Eclipse Cutting Tools are helping to conserve time and tools on many production fronts by giving 100% to 600% longer tool life and quick, efficient interchangeability. Among the cutting tools we specialize in and which will help you to do your war job more quickly and more efficiently are:

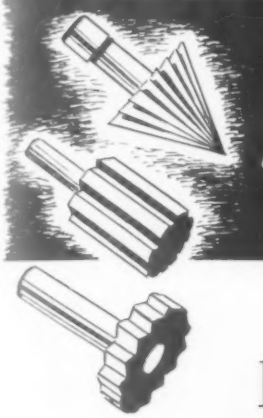
RADIAL DRIVE AND PIN DRIVE
HIGH SPEED STEEL AND
TUNGSTEN-CARBIDE—

★ COUNTERBORES
★ COUNTERSINKS
★ BACK SPOTFACERS
★ TWO-PIECE CORE DRILLS
★ INSERTED BLADE CUTTERS
★ WELCH PLUG CUTTERS
★ MULTI-DIAMETER CUTTERS
★ SPECIAL DESIGNED TOOLS

ECLIPSE COUNTERBORE CO.

DETROIT · MICHIGAN

NEW TOOL STEELS ARE Tricky Unless Accurately Heat Treated



Use DESPATCH FURNACES for

TOOLS
DIES
PRECISION PARTS

Batch type furnace (gas or elec.); sizes 13" x 13" x 13" to 37" x 25" x 37".

Pot type Despatch recirculating convection furnace. Working sizes 8" x 12" to 60" x 60". Also special high temp. models.

"TRICKY" is just the right word for some of the new "NE" steels for tools and dies . . . unless you have a furnace capable of speedy, accurate heat-treatment.

Despatch furnaces are excellent for this purpose. UNIFORM heat is guaranteed in chamber regardless of load size, with ACCURATE temperature control assured at any point in heat range 275°F-1250°F.

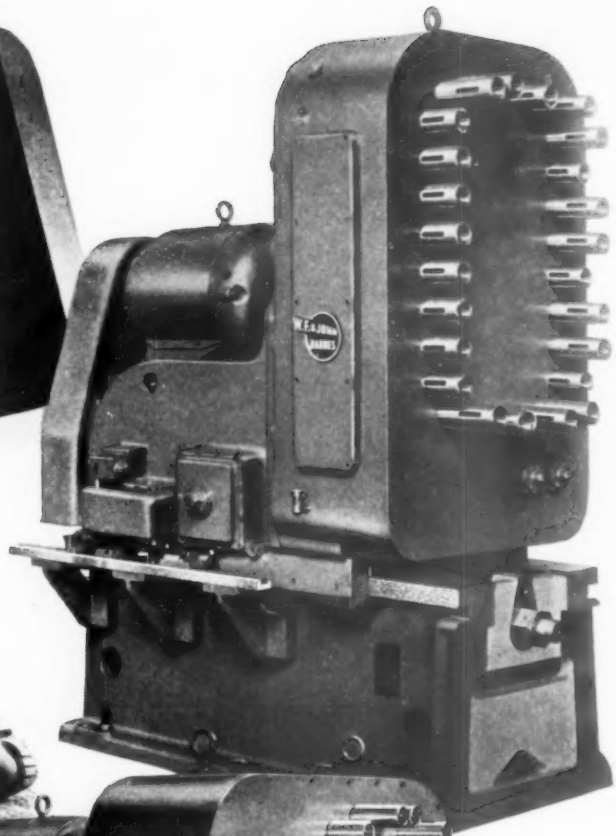
SPEEDY heat transfer and distribution increases efficiency, aids production. FLEXIBLE for many processes; wide utility.

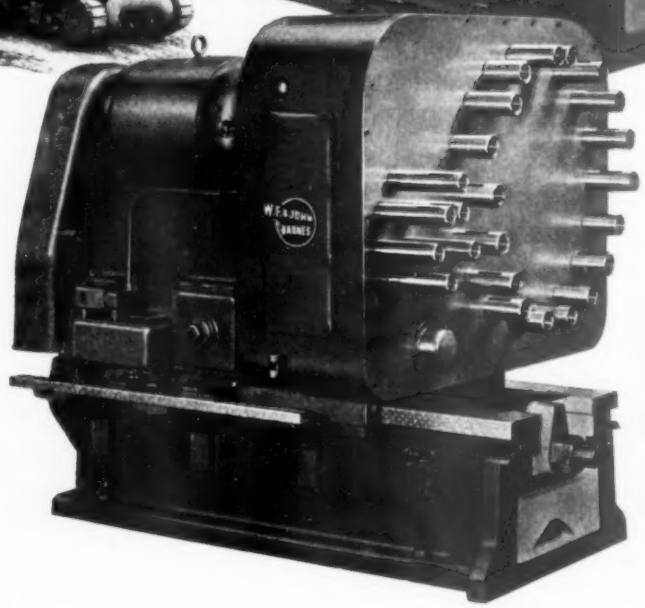
WRITE TODAY! Ask for Bulletin No. 81-T (pot type) furnaces; or Bulletin No. 83-T (batch type).

DESPATCH OVEN COMPANY MINNEAPOLIS, MINNESOTA

TANK PRODUCTION *Increased* VITAL TIME *Saved*

Photograph from
Press Association, Inc.





Here's How!

W. F. AND JOHN BARNES MULTIPLE-SPINDLE DRILLING UNITS GET TANKS TO THE *FIGHTING FRONTS FASTER!*

★ One of America's greatest offensive weapons is the new M-4 tank with its 360-degree revolving turret. Placed on mass production basis by the Automotive Industry and rolling off the assembly lines, where but a short time ago came our fine cars and trucks — these land battleships are proof to the Axis that America is geared to out-produce them in military equipment.

One half the time required to engineer and build the complete machine for drilling the turret of the M-4 Medium Tank was saved.

Here's How! — The two multiple-spindle drilling units, illustrated, furnished by W. F. and John Barnes were substantially the same as our standard hydraulically-actuated SH-24 units. These two units, being of our standard design, with standard drawings immediately available to the customer, required engineering on the drilling heads only!

The fixtures and the balance of the machine, designed and furnished by the customer, were completed at a time to coincide with the completion of the drilling units.

This is another splendid example of the cooperative effort today of American Industry to speed the production of fighting equipment. One unit having 25 spindles and the other having 24 spindles in clusters of 18 and 6, equally spaced, with hardened alloy steel gears and heat treated spindles, were completely equipped with anti-friction bearings.

Are you using drill presses for your jobs that are better suited to Multiple-Spindle drilling?

W.F.&JOHN BARNES

FREE *A set of data sheets on W. F. and John Barnes standard hydraulically-actuated units will be sent to you promptly—send for your copies today.*

W. F. and JOHN BARNES

325 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U.S.A.

A. S. T. E. DOINGS . . . . . .

The "Ladies Night" dinner held by the Elmira Chapter attracted 250 people. Among those attending are shown above, left to right, George N. Morceau, toastmaster; Douglas G. Anderson, speaker; M. Hugh Evans, chairman; and Dolph Kylor, first vice chairman.

Baltimore

Frank W. Curtis, immediate past national president of the Society and chief engineer of the Van Norman Machine Tool Company at Springfield, Massachusetts, was the principal speaker at the November meeting of the Baltimore Chapter on the night of November 4th at the Engineers' Club.

Following the 6:30 dinner, a motion picture entitled "Induction Hardening Machine Parts" was shown. Narration for this picture was given by Mr. Curtis. His topic for the evening's talk was entitled "Tool Engineering."

Boston

The November 12th meeting of the Boston Chapter at Schraffts Restaurant in Boston was reported to be one of the high points of the season. 147 attended the dinner and more than 200 were at the technical session.

First vice chairman, Warren Ames, introduced the gadget speakers. These gadget talks included one given by Mr. Warren F. French, engineer of William H. Field Company at Boston. Mr. French gave a talk on the pitched diameter to measure block chain sprockets with stud arrangement. Mr. Everett R. Leavitt, president of the Essex Tool & Die Company at Newburyport, Massachusetts, gave a talk on one-inch mike frame and center fixed boring tool and also spoke on motorized spindles on cutting large wheels.

H. E. Linsley of the Wright Aeronautical Corporation at Paterson, New Jersey was the main speaker of the evening. He spoke on the details of the manufacture of a Wright 14 cylinder cyclone engine which was illustrated by sound movies plus a short picture on the manufacture of the P-40 airplane.

Chicago

One of the outstanding features of the November 2nd meeting of the Chicago Chapter at Huyler's Restaurant was the motion picture entitled "Romance of Industry." Preceding the picture, which was shown through the co-operation of the Carborundum Company, Mr. J. E. Donald Hastie, industrial education supervisor of the Carborundum Company, presented an outline of the training program furnished to industry in connection with the use of grinding wheels.

(Continued on page 146)

AMERICAN SOCIETY OF TOOL ENGINEERS, INC.

· AREAS · REGIONS · CHAPTERS · DIRECTORS · OFFICERS ·

NEW ENGLAND AREA A

REGION 1		REGION 2		REGION 3	
WORCESTER	25	HARTFORD	7	HAMPDEN COUNTY	6
BOSTON	33	SPRINGFIELD	32	SOUTHERN CONN.	41
PORTLAND	46	TWIN STATES	40	LITTLE RHODY	53
DIRECTOR C. J. LINDEGREN		DIRECTOR I. F. HOLLAND		DIRECTOR FRED J. DAWLESS	

MIDDLE ATLANTIC AREA B

REGION 4		REGION 5		REGION 6		REGION 7	
NORTHERN N. J.	14	SYRACUSE	19	BALTIMORE	13	CENTRAL PENNA.	22
GREATER NEW YORK	34	SCHENECTADY	20	PHILADELPHIA	15	ELMIRA	24
				POTOMAC	48	BINGHAMTON	35
						WILLIAMSPORT	49
DIRECTOR P. W. BROWN		DIRECTOR FRED J. DIEHL		DIRECTOR PAUL W. PENNEBAKER, SR.		DIRECTOR C. D. THOMAS	

CENTRAL AREA C

REGION 8		REGION 9		REGION 10		REGION 11	
PITTSBURGH	8	CLEVELAND	3	DAYTON	18	DETROIT	1
BUFFALO	10	TOLEDO	9	CINCINNATI	21	WESTERN MICHIGAN	51
ROCHESTER	16	RUBBER CITY	47	COLUMBUS	38		
DIRECTOR CECIL E. LUCAS		DIRECTOR C. V. BRINER		DIRECTOR W. J. FREDERICK		DIRECTOR DON T. FLATER	

MIDDLE WEST AREA D

REGION 12		REGION 13		REGION 14		REGION 15	
SOUTH BEND	30	CHICAGO	5	RACINE	2	ST. LOUIS	17
INDIANAPOLIS	37	TWIN CITIES	11	MILWAUKEE	4	TRI-CITIES	23
		ROCKFORD	12	FOND DU LAC	48	PEORIA	31
DIRECTOR HORACE R. WENTZELL		DIRECTOR E. W. DICKETT		DIRECTOR EUGENE BOUTON		DIRECTOR JOHN E. GILCHRIST	

SOUTHERN AREA E

REGION 16		REGION 17	
NASHVILLE	43	HOUSTON	28
LOUISVILLE	54	NORTH TEXAS	51
		WICHITA	53
DIRECTOR H. T. SPROTT		DIRECTOR L. M. COLE	

WESTERN AREA F

REGION 18		REGION 19	
LOS ANGELES	27	GOLDEN GATE	26
SAN DIEGO	44	SEATTLE	39
DIRECTOR WILLIAM F. AGMUS		DIRECTOR WALTER HASSEBOHM	

CANADIAN AREA G

REGION 20	
TORONTO	26
HAMILTON	42
MONTREAL	50
WINDSOR	55
DIRECTOR L. G. SINGER	

1942 ASTE

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ASTE 1943

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1500% LONGER RUNNING TIME

BEFORE CENTER POINT NEEDS ATTENTION

CMD

Helical Groove

CENTERS

When Used With

CMD CENTER POINT

LUBRICANT

have an operating ratio of from 15 to 1 running time over the conventional type of lathe center.

A FEW PROMINENT CMD USERS

ARMSTRONG BROS. TOOL COMPANY, CHICAGO, ILLINOIS
BOEING AIRCRAFT COMPANY, SEATTLE, WASHINGTON
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GENERAL ELECTRIC COMPANY, SCHENECTADY, NEW YORK
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JONES AND LAMSON MACHINE COMPANY, SPRINGFIELD, VERMONT
KINGSTON PRODUCTS CORPORATION, KOKOMO, INDIANA
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Amazing Test

A test will prove that it is impossible to have metal to metal contacts when you use CMD Center Point Lubricants. Prove their superior efficiency with the FREE Sample Kit offered below. Send for it now!

● A BETTER CENTER:

The grooves hold an ample supply of lubricant for replenishing the lubricant that is dissipated because of heat from work expansion between centers and heat generated by cutting tools—*No adjustment of tail stock* is necessary to relubricate. Because the *grooves* are left-hand (in the same direction as the turn of work) they *prevent dripping* and force lubricant to extreme point of center *assuring proper lubrication of entire bearing surface.* No production delays to replace galled or burned-out centers!

● A BETTER LUBRICANT:

CMD Center Point oil withstands pressures greater than *50,000 lbs. per square inch.* Centers can be drawn up tight against work permitting finer tolerance and higher precision results.

Write for FREE Sample Kit

CHICAGO MANUFACTURING & DISTRIBUTING CO.
Dept. 12T, 1928 West 46th St., Chicago, Ill.

Send circular on CMD Helical Groove Lathe Centers

Without obligation to us, send FREE sample kit containing a tube of CMD CENTER POINT LUBRICANT and a tube of CMD CENTER POINT LUBE (grease) with directions for making an amazing, simple test.

NAME.....

FIRM NAME.....

ADDRESS.....

—A. S. T. E. DOINGS—

National president, O. W. Winter, also attended this meeting. President Winter gave a brief report of the director's meeting held at the Springfield Convention. Chicago Chapter's vice chairman, Frank Martindell, covered the technical meeting held at the Springfield Convention.

Cleveland

Dr. Ernest J. Abbott, technical director of Physicist Research Corporation, Ann Arbor, Michigan was the technical speaker for the November 13th meeting of the Cleveland Chapter which was held at the Midday Club in Cleveland.

Approximately 110 members and guests heard Dr. Abbott speak on "Production Control of Surface Roughness and the Profilometer." Illustrating his talk with slides, Dr. Abbott outlined the history and development of the profilometer since its beginning in 1936 up to the present and pointed out how the increased demand and use of the profilometer has kept pace with the progress of World War II.

Mr. C. V. Briner reported on the War Production Conference of the Society which was held in Springfield in October.

Columbus

Designated as "Aviation Night", the entire November 10th meeting of the Columbus Chapter was given over to the building, testing and flying of airplanes.

Meeting in the Blue Room of the Hotel Fort Hayes, the Columbus Chapter held a brief business session following the dinner. After the business session, three reels of sound motion pictures were shown entitled "Japs Bomb Pearl Harbor", "Sky Riders", and "Aerodynamics."

Tool engineers at this meeting also heard an interesting talk by Barton "Red" Hulse, chief test pilot for Curtiss-Wright Corporation, entitled "Modern Aviation". He told of the various tests a new airplane must undergo, how these tests were made and the comparison of the various types of Jap and German planes with our American-made ships.

To round out the evening another film entitled "Filming the Fleet" was shown.

Dayton

Milton Feldstein, tool process supervisor of Delco Products, conducted

(Continued on page 148)

SAVE THOSE BLADES!

You can and should use more than one-half the length of Lovejoy blades

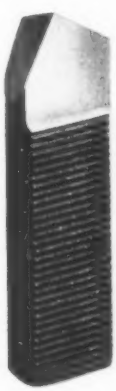
To cooperate with the Government's campaign to save scarce metals, we urge you to get full use out of every Lovejoy blade used in Lovejoy milling cutters.

Be sure to use over one-half your Lovejoy blades (or more on light cuts) — otherwise valuable metal is wasted. Lovejoy's *positive-locking* device guarantees that short blades are held as rigidly as new blades.

When you have used the blades to the limit, *then* order new Lovejoy High Speed Steel, Stellite, Rexalloy, etc., blades — all standard sizes are carried in stock for immediate shipment.

Lovejoy offers a retipping service for Cemented-Carbide blades — information on request.

LOVEJOY
TOOL COMPANY, Inc.
SPRINGFIELD, VERMONT, U.S.A.



NEW
A new Lovejoy blade

SAVE
Still plenty of life left

SCRAP
Sell blades like this to Uncle Sam — he needs them

Looking down, from grinder head end.

Looking from headstock end, guard removed; note step pulleys providing various work head speeds. Headstock may be slid crosswise any desired distance up to six inches.

Front, angle view, work in chuck. Headstock graduated thru 180 degree.

Sav-way

MULTI–PURPOSE

INTERNAL GRINDER

Grinds ¼ to 18" diameter holes, up to 9" deep, straight or tapered. Sav-way grinder offers greater flexibility and will handle a wider range of work than has heretofore been possible on any one machine. Sturdily constructed throughout and suitable for both tool room and production grinding. "Bulletin MI" giving complete specifications sent on request.

Representatives throughout the U. S. A.

Sav-way INDUSTRIES

★ Machine Tool Division ★

4879 EAST EIGHT MILE · DETROIT, MICHIGAN

a panel discussion on "Problems in War Tooling" at the November 9th meeting of the Dayton Chapter held at the Engineer's Club. Discussing problems arising from civilian to war production tempo, affecting labor, plants, and tooling conversion, Mr. Feldstein was assisted by Dave Temple, supervisor of labor relations, and Mr. Chancellor Montgomery, plant layout superintendent, also of Delco Products.

Another feature of this big November meeting was a talk on "Modern Coated Abrasives" by G. G. Thomson, division manager of Behr Manning. Chapter Chairman, Howard McMillan, devoted a few minutes to the highlights of the War Production Conference held at Springfield.

Detroit

Professor C. L. Colwell of the University of Michigan turned in an admirable performance "pinch hitting" for Professor O. W. Boston, who was slated as the principal speaker at the November meeting. Professor Colwell briefly covered the history in results thus far obtained from the important experimental work on cutting tools and lubricants at the University of Michigan. Members and friends took part in the discussion which followed this talk and the following "Trouble Shooting Sequence Chart" was developed: Have changes been made in — 1. Material being machined? 2. Grind of tools? 3. Feeds, speeds and tool material? 4. Condition of Machines? 5. Cutting fluids?

Four past presidents attended this banquet including Mr. Siegel, Mr. Smila, Mr. Carpenter and Mr. Wagner.

Elmira

For the first time in its history, the Elmira Chapter held a "Ladies Night" on November 6th with M. Hugh Evans, Chapter Chairman acting as Master of Ceremonies and George N. Morceau, Chapter secretary, acting as toastmaster. Dolph Kylor, ticket committee head, reported that he had no trouble in disposing of almost all of the 300 tickets that were printed.

Douglas G. Anderson, president of Hardinge Brothers, Inc. was the speaker for the evening and told of the conditions existing in England today as recorded in letters received from a business associate connected with the

(Continued on page 150)

"LOGAN"
HYDRAULIC EQUIPMENT

As Applied to

CROSS SHELL LATHE

Illustrated below is a Cross No. 10 Shell Lathe, manufactured by the Cross Gear and Machine Company. The headstock of this lathe is fitted with a "LOGAN" Model "HR" Rotating Type Hydraulic Cylinder for the actuation of a "LOGAN" Expanding Mandrel. The tool feeds and rapid traverse of the tailstock are hydraulically operated by a "LOGAN" Model "HB" Cylinder. This Cross Shell Lathe is equipped with a "LOGAN" Sure Flow Coolant Pump and Hydraulic Accessories. "LOGAN" Hydraulic Equipment provides positive action and rigid support of the work. Let "LOGAN" Representatives and Engineers make recommendations on your hydraulic problems.

★ **LOGANSPORT MACHINE, INCORPORATED** ★

902 PAYSON ROAD LOGANSPORT, INDIANA

Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories

London plant of Hardinge.

Following Mr. Anderson's address, the Bell Aircraft Corporation of Buffalo presented "Cannons on Wings," a sound movie in color.

Fond du Lac

The first anniversary of the organization of the Fond du Lac Chapter was observed at a dinner meeting on Friday, November 13th at the Retlaw Hotel.

Mr. Eugene Bouton, regional director of the A. S. T. E., Milwaukee, was the principal speaker. He reviewed some of the high-lights of the National Convention in Springfield, Massachusetts, last month.

Mr. W. Z. Fidler, midwestern area vice chairman of the Society Membership Committee, also spoke.

Grand Rapids (Western Mich.)

The Rowe Hotel in Grand Rapids was the scene of the November 9th meeting of the Western Michigan Chapter. 70 tool engineers attended the dinner and 78 heard Herman Goldberg of the R. G. Haskins Company of Chicago talk on "Taps and Tapping Machines."

Hamilton

Said to be the largest attended meeting the Hamilton Chapter has ever had, this November 13th meeting was held at the Iroquois Hotel in Galt.

Harry Whitehall of Whitehall Machine and Tools, Limited, introduced the guest speaker, Mr. R. T. Wise, Director General, Gauge and Cutting Tool Production Branch — Department of Munitions and Supplies. Speaking on "Getting the Most out of Cutting Tools" Mr. Wise quoted figures to indicate the enormous growth in output of small tools in Canada, both in actual dollar value and per capita of population.

In place of a coffee talk at this meeting, a motion picture depicting Fishing on the French River in Northern Ontario was shown.

Hartford

In spite of the tire shortage and gas rationing, more than 175 Tool Engineers turned out for the November 2nd meeting of this Chapter held at the City Club. Following the dinner about 225 members and friends listened to the talk given by Mr. S. D. Fendley of General Electric Company of Schenectady, New York. Mr. Fendley, talking on "Electronic Motor Controls," demonstrated to his audience the results of electrical research in the field of motor speed control. The attending Tool Engineers were said to be very interested in the countless applications of this development in the modern industrial plant.

Los Angeles

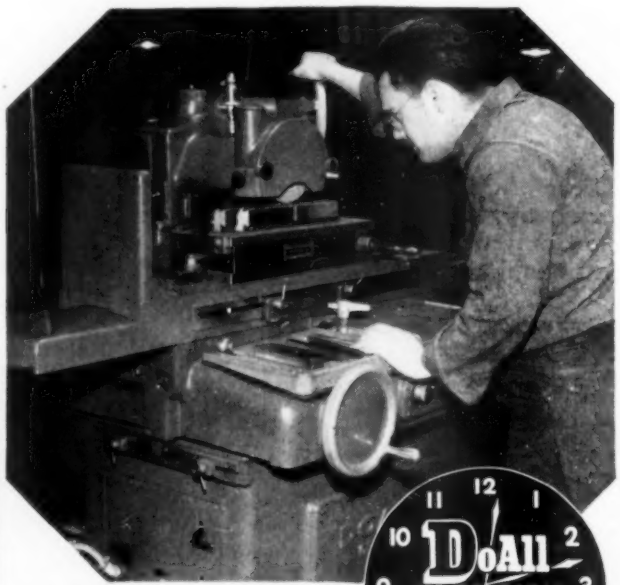
The November meeting of the Los Angeles Chapter was held on Thursday evening, November 12th, with an attendance of 250 members and guests.

Professor T. A. Watson, Supervisor of ESMWT, was the coffee speaker. Professor Watson spoke on the Defense Training Program.

Mr. F. C. Hoffman, chairman of Lockheed Sheet Metal Forming Committee, Lockheed Aircraft Corporation of Burbank, California, spoke on "Contour Forming." Mr. Hoffman's talk was illustrated.

(Continued on page 152)

6 REASONS WHY THIS GRINDER IS THE BEST
EXTRA WEIGHT
OVER ONE TON
EXTRA BEARING AREA
1140 Sq In of Bearings HAND SCRAPED
DIRECT DRIVE
BALL BEARINGS IN SPINDLE ARE SUPER ACCURATE
MASSIVE COLUMN
POWER HEAD RESTS ON A PILLAR OF STRENGTH
PROTECTIVE SADDLE
MECHANISM IS FULLY SEALED
NEW HYDRAULIC DRIVE



View in an Ohio plant. Grinding dove tail form tools for screw machines.

CLOCK BEATER

● Now, when every man hour is so precious, you'll cheer the rapid, high precision performance of the DoAll which turns out all kinds of single or multiple extra-accurate grinding jobs ahead of time.

The DoAll is praised by grinding machine experts because of its supreme accuracy to size, flatness and parallelism.

In fact, the finish is so smooth and mirror-like that you can actually "wring" two flat surfaces together. The DoAll is adaptable to either wet or dry grinding, and comes in two sizes, with 7" or 10" wheel.

Write for complete details about this new and better grinder.

SAVAGE TOOL COMPANY

Dept. TE **Savage, Minnesota**

How Tool Shapes can cause hardening hazards

"IT BROKE!"—the saddest words in the tool maker's language. It may be a newly hardened tool that cracked in the quenching tank—or a die that let go on the press. But whenever it happens, hours of skilled tool making time are wasted—valuable production time is lost.

Many times premature tool failure can be traced to some oversight of the relation of tool design to heat treatment. The following suggestions, based on experience in tool design as it affects the heat treating operation . . . and through the heat treatment, the serviceability of the tool . . . may be of help to you.

Heat treated steel has a certain strength depending upon the analysis of the steel, the quality of the metal, and its heat treatment. Sometimes just the internal strains set up in heat treating exceed the strength of the metal, and the tool cracks before it sees service. Or, if you get it through hardening safely, it may be so weakened that it fails under relatively light loads.

Internal strains arise from many causes, but the most serious are those developed during quenching, by reason of differential cooling of sections of the tool that are of markedly different size or mass. Thus, the differential cooling is largely controlled by the size and shape of the tool being quenched. It is wise to plan tool shapes so that the entire tool may be heated and cooled at approximately the same rate.

The angled shape here suggests a condition to avoid. It is impossible to get uniform cooling at such sharp re-entrant angles as "A" and internal strains are set up right where service stresses concentrate.

This shape illustrates a light section adjoining a very heavy section. It would be practically impossible to harden such a shape in water without cracking at the sharp corner. Even in oil, it would be difficult.

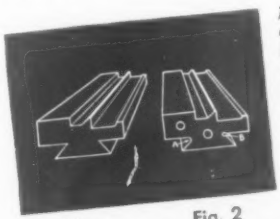


Fig. 1 Fig. 2

Figure 1 shows an undercutting form-tool that would be hazardous to harden because of the heavy and light sections joined by sharp angles. In figure, 2 holes have been drilled to balance these heavy sections and "A" and "B" suggest two ways to avoid the sharp angles.

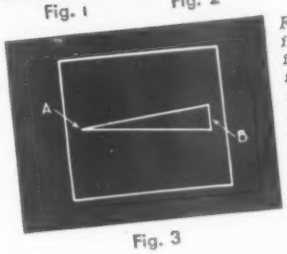


Fig. 3

Figure 3 is an oil-hardening blanking die that failed in service. It was made from a section approximately 3" x 2¾" x ½". Heat treatment and service stresses concentrated at points "A" and "B". A larger section, 3½" x 2¾" x ¾" could have eliminated failure.

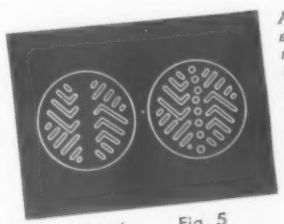


Fig. 4 Fig. 5

Another cause of warping is shown in Figure 4. The heavy rib through the center tends to prevent shrinkage and would cause the die to become oval in quenching. Drilling holes, as in Figure 5, helps overcome the difficulty.

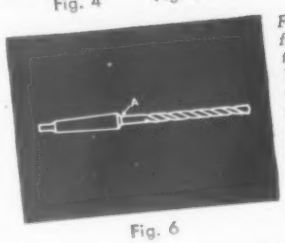


Fig. 6

Figure 6 illustrates a design for twist drills that gave trouble by breaking at "A". When a more generous fillet was allowed at this point, the trouble was eliminated and satisfactory results were obtained.

These tips on the relation of tool design to heat treatment were extracted from "Tool Steel Simplified". They represent only *a part* of the useful information in one chapter of the book. Other chapters provide helpful facts on tool making, heat treating, furnace atmospheres, quenching and many other subjects, including "trouble shooting". Get the benefit of *all* this practical information. Make copies of "Tool Steel Simplified" available to the tool-room men you want to train. Order as many as you need today.

The Carpenter Steel Company, 122 Bern St., Reading, Pa.

315 pages—205 illustrations

Available at cost in the U. S. A. —$1.00 a copy. ($3.50 elsewhere)

More than 32,200 copies of "Tool Steel Simplified" are now in use in several thousand plants like yours to "upgrade" men — save time — "trouble shoot" — get better results.

Carpenter
MATCHED
TOOL STEELS

Another speaker on this program was Anton Peck, sales engineer from Jamison Steel Corporation.

Milwaukee

The Milwaukee Chapter held its November 12th meeting in the Colonial Room of the Republican Hotel. Chairman William Iekel presided over the brief business meeting which preceded the evening's technical talk.

Mr. Radermacher introduced Mr. R. W. Strenke, superintendent of the Lakeside Bridge & Steel Company as the speaker of the evening. Mr. Strenke talked on the subject of "Weldments and Their Manufacture." His lecture was illustrated by films and slides.

The door prize winner for this November meeting was Mr. D. Hertz.

(Moline) Tri-City

The Walnut Room of the Blackhawk Hotel was the scene of the November dinner meeting of the Tri-City Chapter. "Tapping and Tap Grinding" was the subject of a talk given at this meeting by Mr. O. W. Dawson co-owner of the D-S Tap Grinder Company of Ferndale, Michigan. A discussion period followed his talk in which both he and Mr. Dodge of the Super X Gage Company answered technical questions.

Another feature of this November meeting was a premiere showing of three films dealing with the conversion of farm equipment and truck plants to the manufacture of war materiel by the International Harvester Company. This film also showed the company's new tool conservation program and the activities of the U. S. Marines in combat.

Montreal

The November 11th meeting of the Montreal Chapter, said to be a very successful meeting, was held at the Windsor Hotel with about 215 visitors and members present. Those present saw the movie and lecture of Warner & Swasey entitled "Chips."

20 new members for the Chapter were welcomed to this meeting by Jerry Rogers of the membership committee. Mr. H. Odd gave a report on the Springfield War Conference and Mr. Kingsland, Chapter treasurer, reported the purchase of a $300 Victory Bond by the Chapter.

The evening door prize was furnished by the Carbide Tool & Die Company of Hamilton and was won by F. A. Roszel of A. C. Wickman, Toronto.

(New Haven) Southern Conn.

Mr. L. S. Bergen, scheduled speaker for this November 5th meeting of the Southern Connecticut Chapter, held at the Garde Hotel, was unable to be present. However, Mr. Dave Nemser of the International Nickel Company gave a talk on the subject of "National Emergency Steels."

The need for conserving scarce alloying elements and the manner in which the essential elements manganese, chromium, nickel and molybdenum are now being distributed were different highpoints of the talk which was illustrated by slides. As Mr. Nemser disclosed, the steel maker's problem of allocating selected alloy scrap to open hearth and electric furnace heats in an effort to limit the additions of pure alloys, was well ap-

(Continued on page 154)

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EXTREME ACCURACY—
but moderate production
YOU don't have to take on a high-production job before you can reap the full benefit of Gardner PRECISION Grinding.
For modern Gardner Double Grinders are turning in great accuracy records when equipped with Hand-operated fixtures for moderate production. In fact, these machines are identical with the better-known high-production tools, except in the type of fixturing.
HERE is an excellent example, representative of many.
Steel spacing collars, measuring 1⅛" to 1¾" O.D., and ⅞" maximum length, are ground at the rate of 6 TO 8 PER MINUTE on this Gardner No. 125—23" PRECISION Grinder, using a roller gun-type sliding fixture. Tolerances: .0002" to .0005" for parallelism, and ±.002" for uniformity, based upon .008" to .010" maximum overall stock removal.
Purely hand-operated, but you get EXTREME ACCURACY, with good production.
WRITE FOR DETAILS!
GARDNER MACHINE COMPANY
442 East Gardner Street ▸▸▸▸ Beloit, Wisconsin, U. S. A.

THE MYSTERY OF THE MACHINE THAT MOVED!

• When a horizontal saw machine was moved to another floor, blade life dropped from six hours to minutes. Unable to solve this apparent mystery, the manufacturer called in a Barnes man.

"Moving the machine had nothing to do with it," the Barnes representative reported, "but changing from a hard to a soft steel did! The trouble was a balance spring had lost its tension, causing a faulty feed on the softer steel. Blades on that machine now deliver eight hours of service!"

It is by solving problems like this that Barnes men are making a real contribution to war production wherever band or hack saw blades are used. Making saws *work* is just as much a Barnes responsibility as making them *well.*

BARNES BAND SAWS
BARNES Metal Cutting Band Saws
For More Data Per Dollar
For Information on Next Sawing
W. O. BARNES CO. INC.
DETROIT, MICHIGAN

Tangle-proof package for narrow width band saw stock provides easy storage and removal of required lengths.

Call Your Distributor

• Today your surest, quickest, most complete service for practically any staple industrial product is to be had from your Mill Supplies Distributor. Call him *first* when you need anything. And, by the way, next time you order Barnes blades from him, examine the blades carefully. Notice their absolute uniformity.

W. O. BARNES CO. INC.
DETROIT MICHIGAN

A Barnes Blade is Better

preciated.

Another important point spoken about in detail by Mr. Nemser was that users of the new steels should be prepared to modify carburizing and heat treating temperatures and times.

Philadelphia

The Engineers' Club of Philadelphia was the scene of the November 19th meeting of the Philadelphia Chapter. Said to be one of the high-spots of the Chapter's meeting, the technical session of this get-together featured Mr. W. H. Gebhart, manager of sales, Industrial Division, Henry Disston & Sons, Inc. of Philadelphia. Mr. Gebhart gave a talk on the subject of "Tool Conservation and America's War on Waste."

An active discussion followed the talk and several companies presented their ideas on conservation plans.

Pittsburgh

The monthly dinner and meeting of the Pittsburgh Chapter was held on Friday, November 6th at the Mayfair Hotel. 81 members and guests attended the dinner which was followed by a business meeting at which plans for the Christmas meeting were discussed.

The technical part of this meeting featured Mr. W. I. Senger of The Gisholt Machine Company. Mr. Senger spoke on balancing machines and their application to the static and dynamic balancing of high speed rotating parts. His talk was illustrated with slides and included a motion picture which showed the Gisholt balancing machine in actual use.

Racine

Chairman Wm. C. Davidson presided over the Racine Chapter's first fall and winter program, held at the Racine Elk's Club on the night of October 12th.

Coffee speaker before the 100 or more members and friends present, was regional director, Mr. Eugene Bouton of the W. P. B. offices at Milwaukee. Mr. Bouton gave a report on the National Convention which was held at Springfield, Massachusetts.

In addition to Mr. Bouton's talk, an educational film which was entitled "The Making and Shaping of Steel," was shown. This film showed the phases of steel making, from the mines to the finished product. Mr. Smith and Mr. Elliot of the Carnegie-Illinois Steel Co. were commentators on this film.

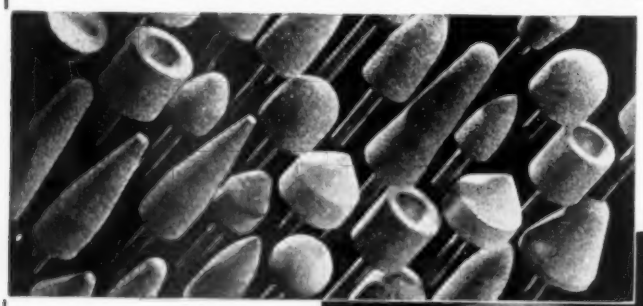
Rochester

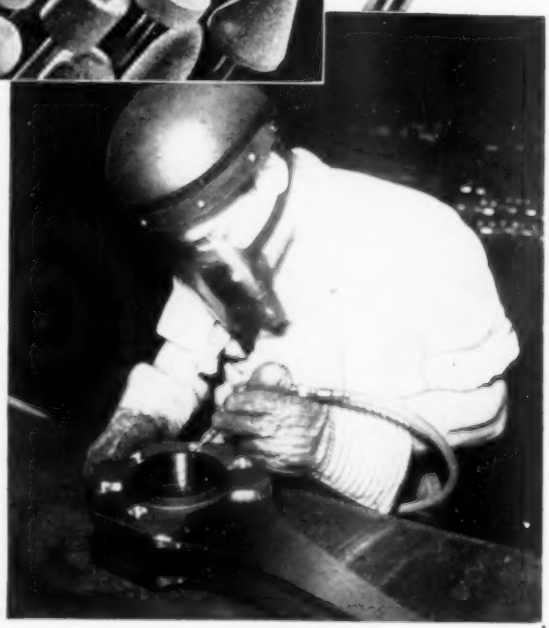
185 members and guests who attended the November 11th meeting of the Rochester Chapter heard Mr. Lester Detterbeck, president of the George L. Detterbeck Company of Chicago talk on screw machine cam and tool layouts.

Mr. Detterbeck described the early days of his company, their venture in training people in the proper technique of the cam layout procedure, and their present service in this field. Mr. Detterbeck's talk included some 800 feet of colored film which showed the manufacture of screw machine cams. The discussion period which followed brought out such questions as how to do a certain threading job, how to avoid drag or pressure, knurling problems and turning problems, and the merit of different size machines.

(Continued on page 156)

ATTENTION CALLED TO ACTIVE DUTY ON THE PRODUCTION FRONT





●We have a new job—to keep grinders going full blast all over the country in every war industry — in machine shops, tool rooms, experimental laboratories, repair departments, arsenals.

Our complete facilities are now devoted to making CHICAGO Mounted Wheels and Vitrified Grinding Wheels 3" and under in diameter. We're proud and happy to be given this definite and important part in the War Program. Our work goes on night and day supplying these vital aids for Victory.

Send us your priority orders for mounted and unmounted grinding wheels up to and including 3" in diameter. You will get the right wheel for the job—when you want it.

We no longer manufacture the larger grinding wheels. We're sorry to have to disappoint our good customers (many of whom have been with us for half a century) on their orders for Vitrified Wheels over 3" in diameter.

Specializing on high production of Mounted Wheels, Cut-off Wheels and small Vitrified Grinding Wheels will be our job until the war is won. We know you will understand.

YOU SHOULD HAVE OUR NEW CATALOG

It shows in actual colors and exact sizes the most complete line of Mounted Wheels made. Send for copy today.

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Please send new Chicago Mounted Wheel Catalog

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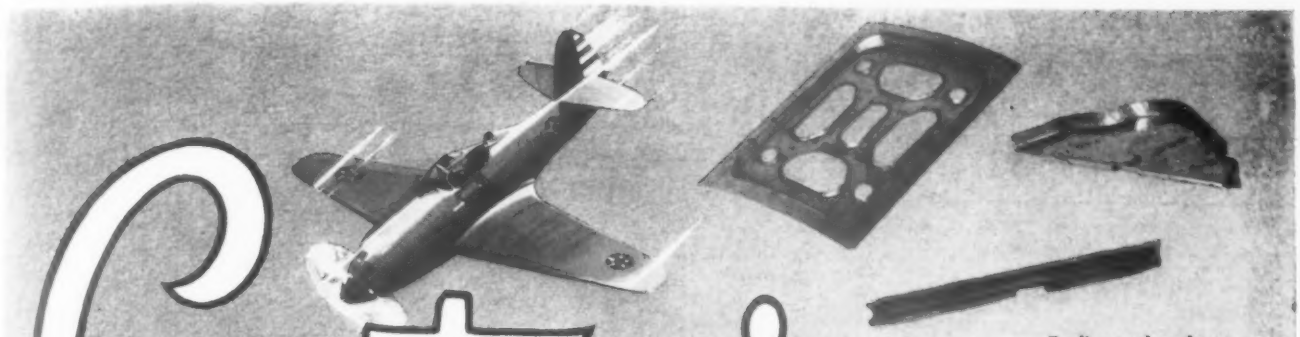
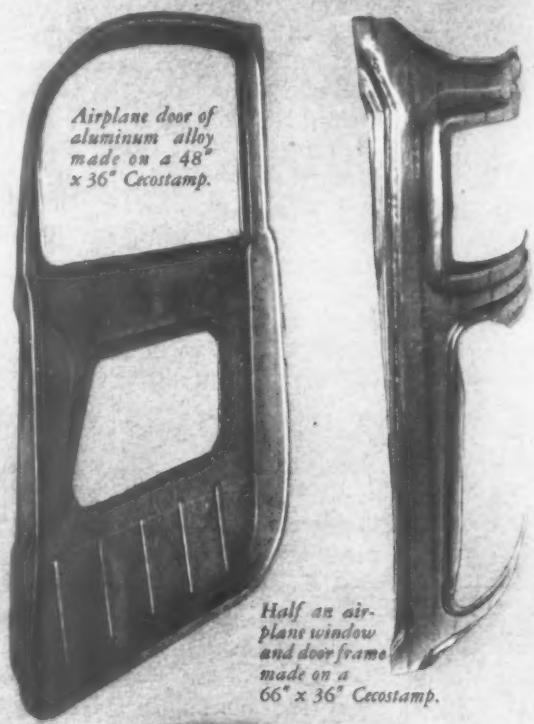


Cecostampings

Radio panel and gussets made of aluminum alloy.



Airplane door of aluminum alloy made on a 48" x 36" Cecostamp.

Half an airplane window and door frame made on a 66" x 36" Cecostamp.

Unlike most other machinery being used in the war effort, the Cecostamp is something new in production machinery. An original design by Chambersburg Engineering Company, the Cecostamp is a high production impact type stamping machine for forming high strength sheet metal parts such as stainless steel and many aluminum alloys. By using a Cecostamp, it is possible to form difficult metals with greater true-to-die accuracy and fewer operations. The operator has control at all times of the metal flow of the stamping and is able, therefore, to produce desired shapes without drawing or a reduction in sectional areas. Controlled stamping overcomes the resiliency of hard-to-form metals while giving them a permanent set at a greater rate of production. A few examples of Cecostampings are shown.

For complete details of Cecostamping and more examples write for a copy of "Cecostampings."

CHAMBERSBURG ENGINEERING CO.
CHAMBERSBURG PENNA.

Cover

CECOSTAMP

The modern drop stamp for difficult forming of high strength steel and aluminum alloy sheet metal parts.

Airplane nose or spinner of stainless steel made on a 66" x 48" Cecostamp.

CHAMBERSBURG
CECOSTAMP
HAMMERS PRESSES

Joe Schick of Delco Appliance Division presided at this meeting in the absence of Chairman Sears. 85 members and friends attended the dinner which was served preceding this meeting at the University of Rochester, Todd Union.

Rockford

It has been reported that the ladies night of the Rockford Chapter was a huge success. Held at the Faust Hotel on the night of November 5th, some 200 members and ladies attended this party.

Feature of the evening was an address by Mr. Marquardt, foreign editor of The Chicago Sun and an authority on the eastern theater of war. Mr. Marquardt spoke on the war in the Pacific and gave A. S. T. E.'ers attending this meeting many pertinent facts on the situation.

The program also included vaudeville entertainment from Chicago.

Green Help? ...SURE!
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THE FIRST WEEK!

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St. Louis

The regular monthly meeting of the St. Louis Chapter was held at the Hotel Melbourne on the night of November 12th.

Mr. G. C. Hazard, chief engineer of the Lubrite Division, Socony Vacuum Oil Company, gave a lecture on cutting oils. Mr. E. B. Freemon assisted Mr. Hazard.

San Diego

67 members and visitors were present at this October 30th meeting of the San Diego Chapter which was presided over by Mr. Charles Lord, first vice chairman.

Speaker of the evening was Mr. Sam Gurley of the Naval Air Station. His subject was on "The Design of Plastic Dies and the Use of Plastics in Airplane Construction." Two pictures were shown following Mr. Gurley's talk. They were on physics in metal cutting and external broaching. These pictures were secured from Mr. Wagner of Los Angeles and an explanatory talk was given with these pictures by Mr. H. H. Hapke of Consolidated Aircraft.

Wm. Asmus, Regional Director, gave a report of the Springfield Convention at this meeting. Also included at this meeting was the resignation of Mr. Ed Giesselman as third vice chairman. Mr. Giesselman is now employed by the Consolidated Texas Plant.

(San Francisco) Golden Gate

The Golden Gate Chapter (Oakland & San Francisco) held its October 13th meeting at the Engineers Club in San Francisco and was attended by 92 members and guests.

A very unique feature of this Chapter's meeting was a technical session in the form of a quiz program, entitled "Technical Information Please." The board of experts included Mr. Karl Bues, Grove Regular Company, Oakland; Mr. Harry Dull, Moore Machinery Company, San Francisco; Mr. DeWitt Grimm, Marchant Calculating Machine Company, Oakland; Mr. Ora L. King, King Oil Company, San Francisco; Mr. Carl Peterson, Merco-Nordstrom Valve Company, Oakland; and Mr. Al Wright, Wright Screw Products Company, San Francisco.

Chairman Walter Kassebohm acted as the interrogator for this program. Each expert was free to answer any question, and if they were stumped,

(Continued on page 158)

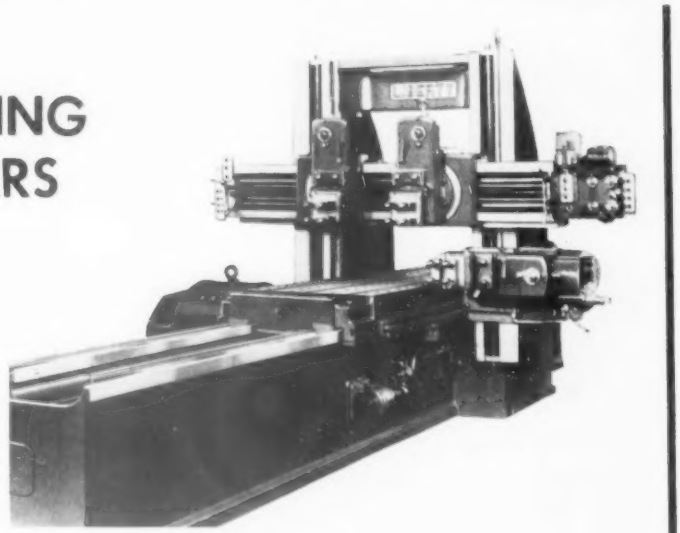
LIBERTY PLANERS

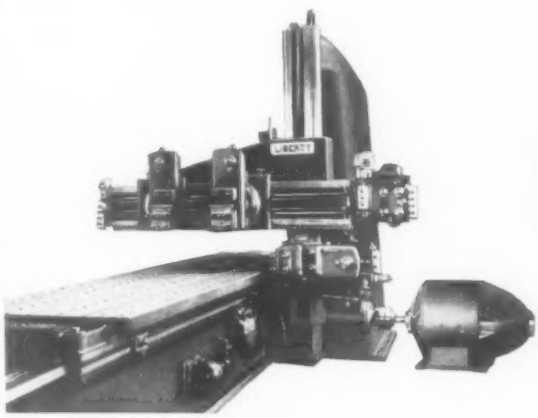
DOUBLE HOUSING—OPEN SIDE—CONVERTIBLE DIE BLOCK—FROG & SWITCH PLANERS.

LIBERTY-DOUBLE HOUSING HEAVY DUTY PLANERS

Double Housing Planers are ideally suited for large production on work lying within a defined range. Rigidly constructed, this planer will handle precision work with utmost accuracy. Easy to operate. Constantly lubricated. Fully motorized for all automatic operation.

Sizes from 36" to 132" inclusive.





LIBERTY-OPEN SIDE HEAVY DUTY PLANERS

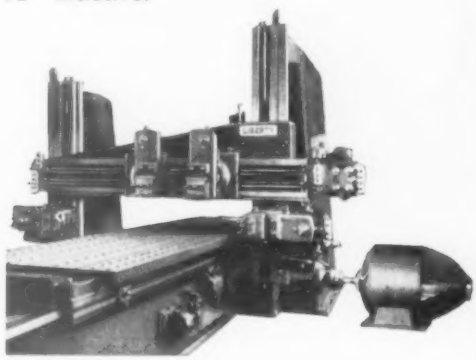
The Liberty Open Side Planer will meet the requirements of the shop handling work of variable widths on a single machine. Extra wide faced housings for rigidity. Fast and accurate. Easy to operate. Fully motorized for all automatic operation. Constant lubrication.

Sizes from 36" to 72" inclusive.

LIBERTY-CONVERTIBLE HEAVY DUTY PLANERS

The Convertible Planer combines the versatility of the Open Side with the rigidity of the Double Housing. Left hand housing moves in and out permitting use of side heads on unusual narrow work. Fast and accurate. Fully motorized for all automatic operation. Easy to operate. Constantly lubricated.

Sizes from 36" to 144" inclusive.



Liberty Planers of all sizes and types are in operation all over the world. Hundreds of shops now under severe war schedules are obtaining maximum results with Libertys.
Liberty Planers are manufacturers of Medium Duty and Standard Duty Planers in many sizes and Styles as well as the Heavy Duty type illustrated on this page.

CONSULT OUR NEAREST REPRESENTATIVE OR FACTORY DIRECT FOR INFORMATION AND DATA ON PLANERS

LIBERTY PLANERS INC.

1005 WELLER AVENUE • HAMILTON, OHIO

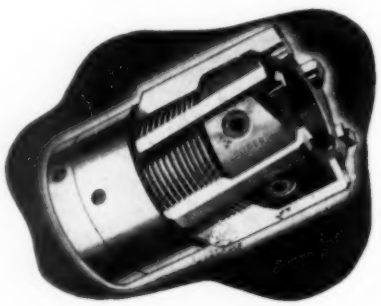
the person asking the question was given a good cigar. It is reported that in spite of a good board of experts seven cigars were given out at the meeting.

Also included at this meeting was a film by the Aluminum Company of America entitled "How to Machine Aluminum." This film showed principles of machining aluminum on shapers, lathes, milling machines, and screw machines. It also showed the lubricants used for fine finishes and proper rake angles of all cutting tools for the various machines they are used on.

Schenectady

The October 7th meeting of the Schenectady Chapter was held at the Ten-O-One Veteran's Memorial Hall at Scotia, New York. Speaker at this meeting was Mr. A. S. Binck of the Works Laboratory. Mr. Binck gave a talk on the technique of arc welding and showed several films on the subject.

TO USERS OF McCROSKY SUPER REAMERS



NOW IS THE TIME FOR ALL GOOD TOOLS TO RECEIVE GOOD CARE

AMERICAN INDUSTRY has to make the most of what it has these days—and make that most go a long way. This applies to any given equipment in any given plant, but we're thinking particularly about McCrosky Super Reamers and you machinists who use them.

Built to give long, dependable service, McCrosky Super Reamers are proving equal to the emergency right up where the going is toughest on the war production front. And for the sake of your production and our war, we want to make sure that those war production weapons have the best possible care and servicing.

So we have prepared a brief, illustrated manual about the fundamentals of reamer grinding and maintenance. Write for the McCrosky Reamer Manual. It will help insure the maximum efficiency and long life of your weapon.

E.S.T. 1904
McCROSKY TOOL CORPORATION
MEADVILLE, PA.

WRITE NOW FOR

McCROSKY REAMER MANUAL

Seattle

The November 10th meeting of the Seattle Chapter was held at Crawford's Sea Grill. The 44 tool engineers and guests present saw two sound motion pictures shown through the courtesy of Boeing Aircraft Company. These pictures were entitled "Building a Bomber by Martin" and "Air Supremacy by Wright."

Four guests were introduced at this meeting including Mr. Horton, Mr. Barnum, Mr. Rosne and Mr. McLaughlin of the Boeing Aircraft Co. Mr. Horton mentioned briefly some interesting highlights of the Alaskan highway, where he was recently employed.

Syracuse

Phillip M. McKenna of McKenna Metals, Latrobe, Pa. spoke before the November 10th meeting of the Syracuse Chapter held at the Syracuse Hotel. Mr. McKenna talked on design, grinding, and use of carbide tools. His talk was illustrated by slides and a movie was shown on milling and fly cutting operations on steel, using carbide cutters.

Mr. Urban acted as chairman and conducted the business session which followed the technical meeting.

Springfield

Oscar Kochler of Greenfield Tap & Die Corporation was technical speaker at the Springfield Chapter's November 9th meeting which was held at the Hotel Highland. Chief engineer of his company, Mr. Kochler talked on "Thread Gage Designs and Threading Problems." Mr. E. C. Tucker of the Holyoke Rationing Board was the coffee talker. Also included at this meeting was a movie on "Machining Aluminum."

(Springfield, Vt.) Twin States

The regular monthly dinner meeting of the Twin States Chapter was held on November 12th at the Masonic Temple in Springfield. The dinner meeting was opened at 7:30 with 103 members and guests present.

The technical session featured Mr. George E. Brumbach, metallurgist of the Carpenter Steel Company, who was introduced by chairman Robert S. Gillette. Mr. Brumbach talked on "Application and Misapplication of Tool Steel." His lecture was accom-

(Continued on page 160)

NORTON No. 2
Cutter and Tool
GRINDER

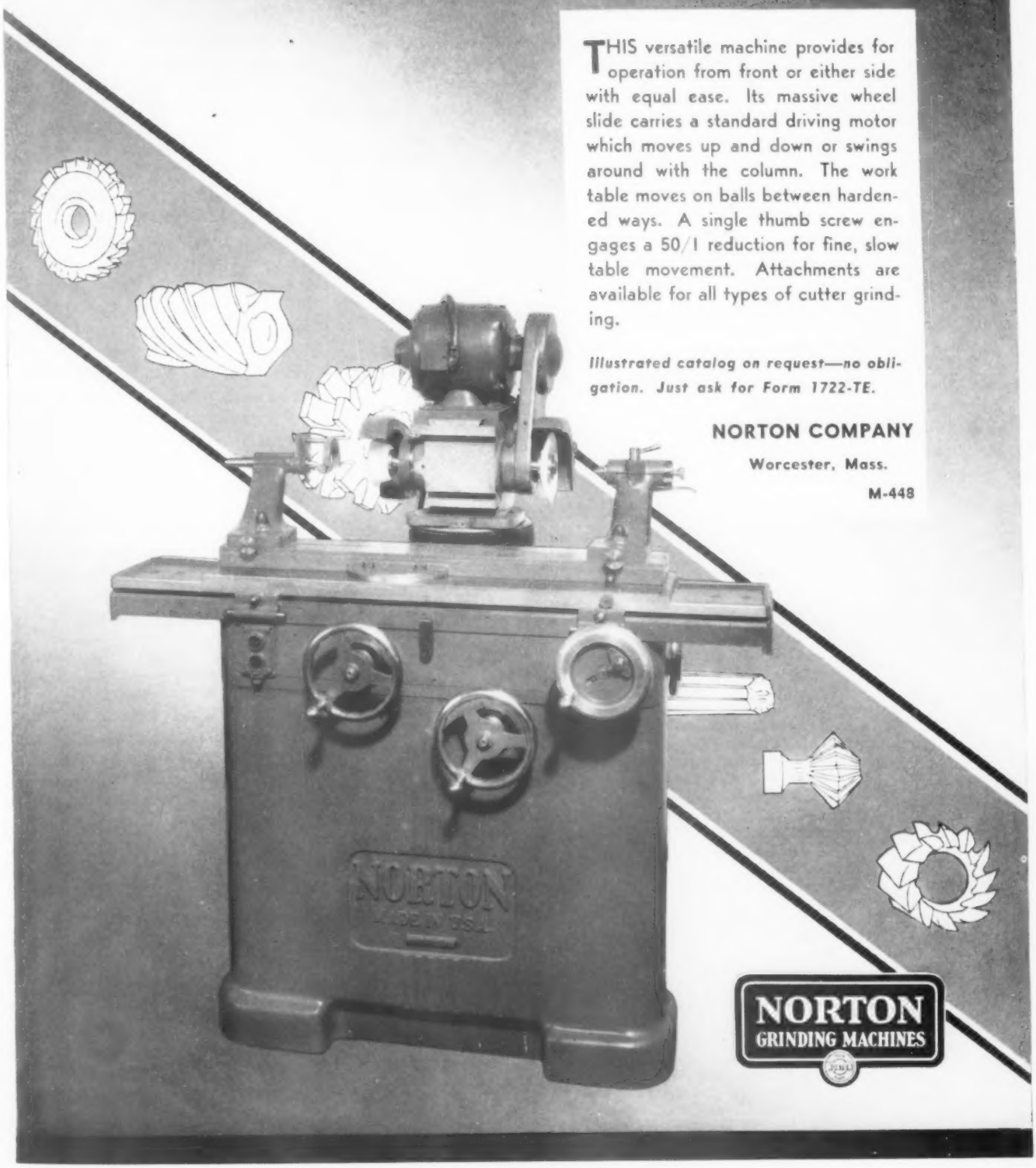
THIS versatile machine provides for operation from front or either side with equal ease. Its massive wheel slide carries a standard driving motor which moves up and down or swings around with the column. The work table moves on balls between hardened ways. A single thumb screw engages a 50/1 reduction for fine, slow table movement. Attachments are available for all types of cutter grinding.

Illustrated catalog on request—no obligation. Just ask for Form 1722-TE.

NORTON COMPANY

Worcester, Mass.

M-448



panied by colored slides.

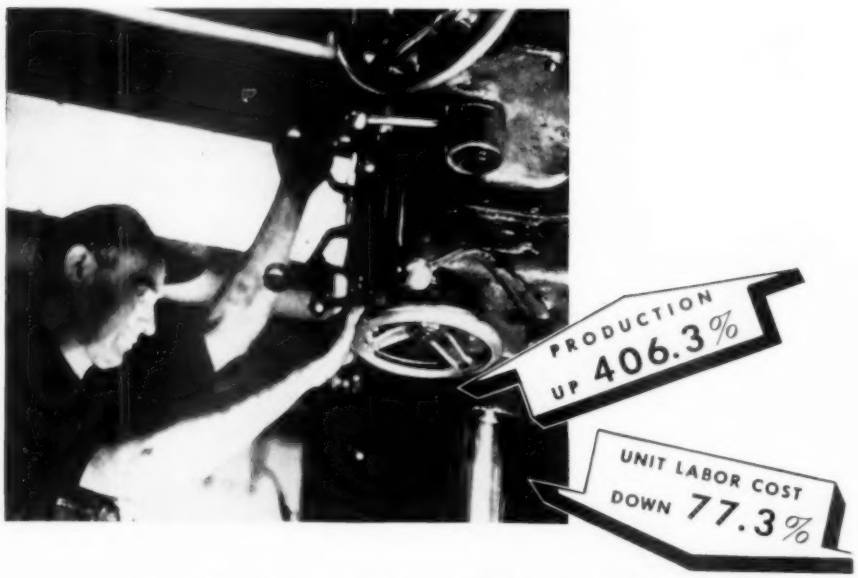
Another speaker on the evening's program was Mr. Ross McKinney who gave a talk based on his experiences as a guide in the Maine Woods.

Toronto

The Toronto Chapter's November meeting was in the form of a visit to the Central Technical School at Toronto, one of the continent's pioneers in 24 hour operation for war emergency training. The school has some 2,900 pupils and teaches everything from foundry to machine shop and tool room work.

The 45 members who attended this meeting had supper in the school cafeteria and afterwards saw the Warner & Swasey film entitled "Chips," which was presented by Mr. Gascoigne.

The members were escorted through the school where they saw the work of both the regular technical evening classes and the war emergency training classes.



—and They Save Their Investment
EVERY 3 DAYS

These figures concern a company which secured a war contract necessitating a complete product change. When finally set up and into production on the new product, their best daily average was only 23.65% of the production they had to have to meet contract terms.

The entire problem was put up to LaSalle. Our capable engineers dug right in and when they had finished, here's how matters stood: A 406.3% increase in daily average production had been achieved. The unit labor cost had been reduced by 77.3%. And scrap rejections had dropped from a heart breaking 57.5% to a tolerable 7.86% of output.

No new machinery was bought. No wage incentive plan was used. Our nominal fee was the only expense involved. And our client now saves the equivalent of that fee *every three days*.

This was not that one case in a thousand. It's the sort of job LaSalle's staff of experienced engineers does day in and day out. This same competent outside help can go to work today on your particular problem, whatever it may be. Consulting LaSalle on how to get the results you're after, costs you nothing. For all the details, write, wire or telephone today.

LASALLE DESIGNING CO.
634 West Lake Street, Chicago, Illinois

TOOL DESIGN • PLANT LAYOUT
MANAGEMENT ENGINEERING

Wichita

M. M. Ross, presiding chairman, called this October 27th meeting of the Wichita Chapter to order.

Held at the Hotel Broadview, this meeting included a talk by Jim Wiley on his visit to the Chrysler and the Ford Willow Run Plant in Detroit. Chairman Ross gave a report on the conference held in Springfield, Massachusetts.

Williamsport

A delicious turkey dinner brought members and guests of the Williamsport Chapter together at the Elks Club on October 19th.

After the reading of the minutes and the Treasurer's report, chairman Lester Lantz turned the meeting over to the founder of this Chapter, Mr. Ed L. Greer. Mr. Greer, formerly of The Aviation Corporation, is now located in Detroit. Mr. Greer spoke on the procedure involved in the production and processing of metals and the important relationship of tool engineers. In order to give a clearer picture, Mr. Greer called on Mr. George Shemory, purchasing agent; Mr. Harry Marlett, production supervisor; Mr. Claude Towar, time study supervisor; Mr. L. E. Zimmerman, tool designer; and Mr. James Jones, inspection department. These men gave an analysis on how their departments fit into the picture.

Mr. Greer then called on Mr. P. E. Garlent, vice president of the Aviation Corporation, who spoke on the subject, "If It's almost Right — It's Wrong".

Windsor

The November 9th meeting of the Windsor Chapter, held in the Prince Edward Hotel, featured Mr. Frank W. Curtis, chief engineer of the Van Norman Machine Tool Company and past president of the A. S. T. E. who gave a coffee talk and showed a film on "Induction Hardening."

125 members and guests assembled for this meeting also heard Mr. Curtis address the technical session with an illustrated talk on "Tool Engineering."

At the conclusion of this meeting Mr. Adrian L. Potter, national secretary, presented chairman A. J. Norman with the first chairman emblem to be issued by the A. S. T. E.

Worcester

Putnam & Thurston's Restaurant

(Continued on page 162)

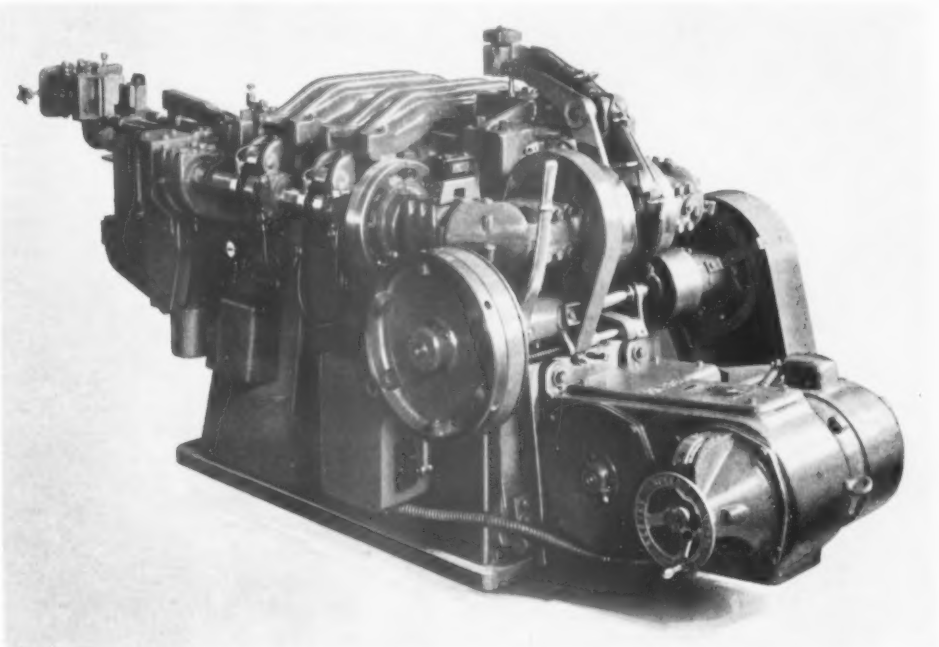
. . . AND PASS THE AMMUNITION!

The call for more "ammunition" to supply our worldwide battlefronts is being met at home by the increased production speeds being attained in American munitions plants. In these plants — producing essentials of war that range from guns to aircraft engines, to precision instruments — U. S. Multi-Slides are doing their part.

These U. S. Multi-Slides are well suited for the fabrication of metal parts from coiled stock. Parts calling for piercing, swaging, embossing, blanking and forming are produced complete in the machine.

A particularly interesting application at this time is the fabrication of bullet-holding links for use in machine guns and aircraft cannon.

For complete description of the U. S. Multi-Slide, write for Bulletin No. 15-T.



U. S. Tool Company, Inc., Ampere, (East Orange) New Jersey. Manufacturers of U. S. Multi-Slides, U. S. Multi-Millers, U. S. Automatic Press Room Equipment, and U. S. Die Sets.

U. S. Multi SLIDE

was the scene of the November 3rd meeting of the Worcester Chapter. In spite of gas rationing many members were present including George Grover, Henry Butler and Mr. Loy of the Union Twist Drill Company. Another visitor at the meeting was Bob Palmer of Hartford. New faces at this gathering included Mr. Bradford Reed and Mr. Floyd Hanson.

The speaker at this meeting was Ernest V. Flanders of the Jones & Lamson Machine Company at Springfield, Vermont. Mr. Flanders spoke on modern developments in thread grinding.

(Washington, D. C.) Potomac

The Harrington Hotel was the scene of the November 5th meeting of the Potomac Chapter. Chapter chairman Siefret presided and introduced the speaker of the evening, Mr. V. H. Ericson of the Norton Company's Abrasive Division at Worcester.

Mr. Ericson's subject was "Refined Surface Finishes As Applied to Cutting Tools." Four motion pictures entitled "Tool Grinding", "Metal Grinding", Cylindrical Grinding", and "Surface Grinding" were also shown at this meeting through the courtesy of the Norton Company.

Harry Springer gave the gathering a few of the highlights of War Production Conference held at Springfield. Plans for the First Annual Anniversary Dance were announced at this meeting.

"No Visible Signs of Wear"
CASE D2142
Large worm gears of Ampco Metal grade 18-23,
Operating conditions:
Marine Service
Unit stress on teeth:
6000 lbs. per sq. inch
Rubbing speed: 200 ft. per min.
RESULTS:
12 months without visible signs of wear.

"AMPCO" Bronze Worm Gears Stand Up Under Heavy Loads . . .

Microstructure of Ampco Metal, Grade 18-23

In Marine service — often miles at sea where breakdown cannot be tolerated —Ampco gears stood up month after month and showed no signs of wear. Here again the bronze proved its merit under tough service conditions.

Ampco Metal grade 18-23, has all that is needed in a gear bronze—bearing properties; correct microstructure; shock resistance; strength under dynamic loading; and hardness to resist brinnelling and deformation under extreme load conditions. It has proved itself under varying applications to be an outstanding bronze for gear service, and is backed up by 28 years experience in alloying bronze. . . . Thoughtful plant executives will investigate Ampco Metal. Ask for free bulletin "Ampco Metal in Gears."

AMPCO METAL, INC.

DEPARTMENT TE-12 MILWAUKEE, WISCONSIN

AMPCO METAL

AMPCO

THE METAL WITHOUT AN EQUAL

WANTED

Technical speakers from manufacturing concerns qualified to appear before Chapter meetings of the A.S.T.E. to talk on Tool Engineering and allied subjects including motion pictures and slides on this type of material. Write to: CHAPTERS SERVICE BUREAU, American Society of Tool Engineers, 2567 West Grand Blvd., Detroit, Michigan.

CHIPS FROM A. S. T. E. NATIONAL HEADQUARTERS

This is Miss Geraldine Morris, known to her friends as "Jerry." She is the young lady who should know a lot about members of the A. S. T. E., for she is the one who follows you from one job to the next, who watches

Miss Geraldine Morris
Keeps tab on promotions.

your promotions as your title changes. A very pleasant young lady, with a ready smile, she says she will grow old before her time and may become

(Continued on page 164)

This is an *URGENT WARNING*

To All Users of Metal Cutting Tools

DO YOU KNOW that manufacturers of high-speed Metal Cutting Tools are experiencing serious delay and difficulty in securing enough high-speed steel to provide the tools you need so urgently? Well, they are! And the situation is fast becoming *critical.*

DO YOU REALIZE that such a condition will mean a smaller supply of these cutting tools for your production and, consequently, less, instead of more, war material will be turned out? An inadequate flow of war equipment will lead to—well, you know what that means in terms of Total War.

IN PLAIN ENGLISH *our very lives* and the preservation of our country depend on the salvage of high-speed steel and the return of this metal to recognized manufacturers of tool steel. Each of us must:

1. Gather together all broken and undersized HSS tools—tons of HSS can be found tucked away in tool boxes, tool cribs, stockrooms and various other places—and
2. Take all obsolete HSS tools from our stock shelves and

Sell this High-Speed Steel to a tool steel manufacturer

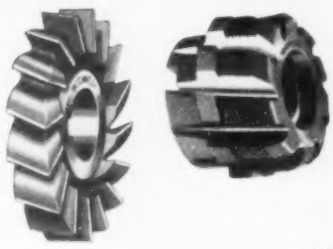
MIDWEST

Contributed to America in her efforts to win this war by

MIDWEST TOOL & MFG. CO.

2364 W. Jefferson Ave. • Detroit, Mich.

END MILLS • SLEEVES • COUNTERBORES • DRILLS • SPECIAL TOOLS • REAMERS
FORM TOOLS • CARBIDE TIPPED TOOLS • ADJUSTABLE HOLDERS



a gray-haired sourpuss if Chapter Secretaries do not send in address changes promptly and correctly. To Chapter Secretaries particularly, we take pleasure in presenting the girl behind the signature, "Geraldine Morris."

* * *

National Vice-Chairmen of Membership have been doing an excellent job in co-ordinating the work of Chapter Membership Committees and in filing promptly new applications for membership. Membership is increasing rapidly, with the record at National Office showing 11,381 members as of October 30, 1942. Many members are remembering to pay their 1942 dues as the "dead-line" draws near. Some, however, will soon be surprised by a letter from National Secretary Clyde Hause, explaining that the period of grace has passed and that they have been dropped from membership in A. S. T. E. Remember, according to the Constitution and By-Laws, once a member is dropped from the records for delinquency, it will cost him a new application and a $5 initiation fee to get back into the Society and who wants to lose the many advantages of membership. The following is culled from a Membership Committee correspondence:

"Its Area Vice-Chairmen have improved membership conditions in a large degree by the mailing of monthly membership letters to the Chapters in their respective Areas. Dues are being paid and membership is increasing. The quality of applicants, the completeness of the information listed on the applications, plus the greater number received at Headquarters, indicates results from the co-operation given by the Area Vice-Chairmen and the Chapter Membership Committee Chairmen. Keep up the good work"!

* * *

The young lady whose picture appears on page 162 was kept quite busy during the month of October. Her task is one of infinite detail, particularly, with reference to address changes. During the month of October, we had 108 requests for changes of address directly to this office. THE TOOL ENGINEER forwarded to us 267 additional changes, making a total of 375 for the month. On the basis of 17 operations per address change, we find that Miss Morris, in this phase of her work alone, carried through 6,375 operations. The National Office is doing its best to simplify this complicated process of making address changes and keeping them correct . . . up to the minute.

* * *

National president O. W. Winter recently announced the appointment of Lester P. Martin of Oakland, California, as vice chairman of the Western Area for the National Editorial Committee. A member of the Golden Gate Chapter, Mr. Martin has been a member of the American Society of Tool Engineers since September 1940 and has an engineering record at the National Office which goes back more than 25 years.

Fort Wayne Makes Plans

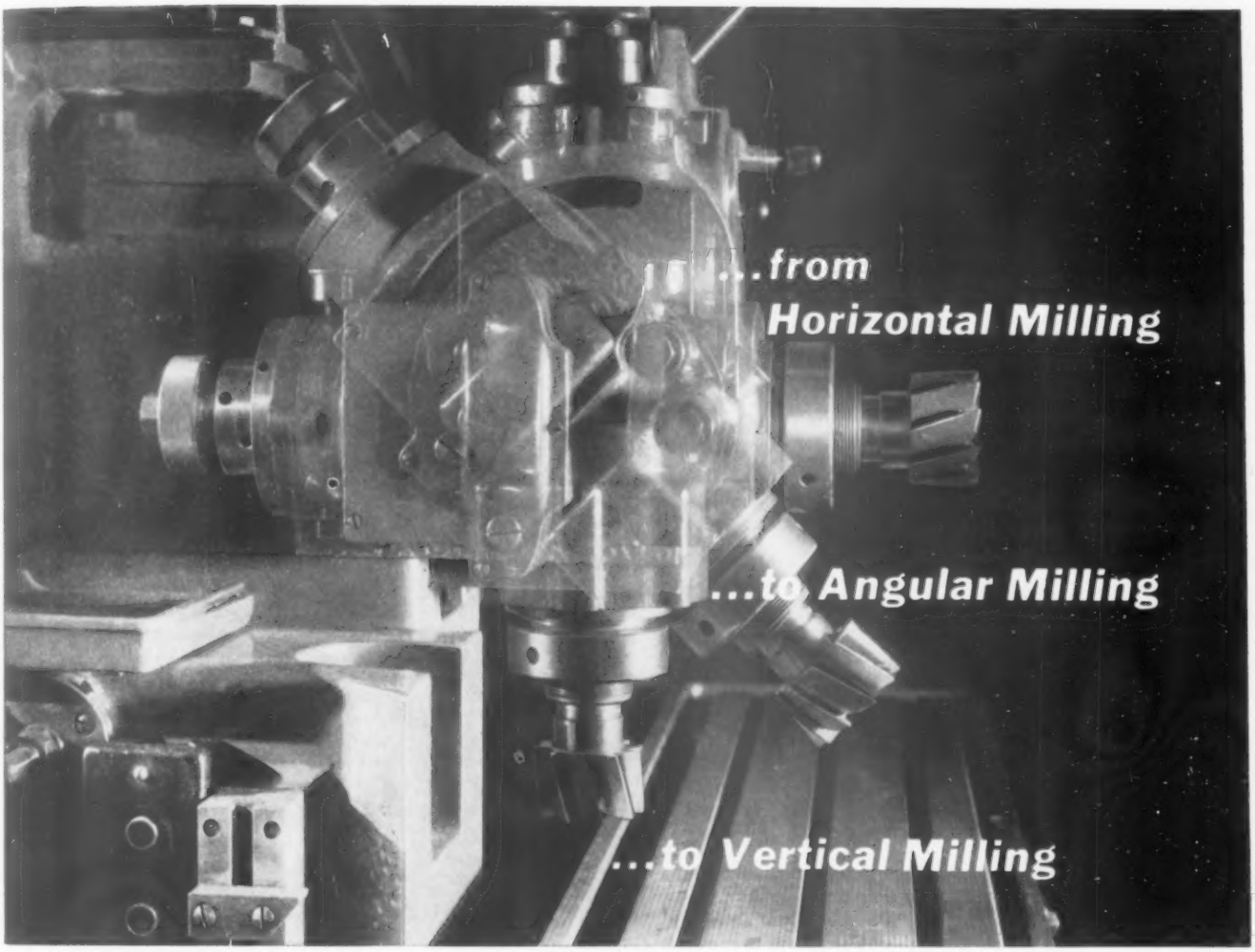
On invitation of Regional Director Horace R. Wentzell, 20 Fort Wayne Tool Engineers met at Hotel Keenan Sunday morning, November 15th, and

(Continued on page 166)

ADDED PROTECTION-
NO EXTRA COST!
ALL-PURPOSE MOTORS
TOTALLY-ENCLOSED MOTORS
EXPLOSION-PROOF MOTORS
FLANGED TYPE MOTORS
GEARHEAD MOTORS
SPECIAL TYPES BUILT TO SPECIFICATIONS
BUILT-IN MOTORS
LIMA GEARSHIFT DRIVES
ADDED PROTECTION – AT NO EXTRA COST . . . That's what you get when you buy LIMA Type RS Electric Motors. The Semi-enclosed DRIP-PROOF feature makes the LIMA Type RS outstanding as an all-purpose motor . . . and, there is NO EXTRA COST for this protection over the standard open type motor.
The LIMA Type RS is built in sizes from ½ to 75 H.P. brake test. Is adaptable to production lines, individually operated machine tools and general manufacturing locations where totally-enclosed motors are not especially needed. The Semi-enclosed DRIP-PROOF feature affords maximum protection against chips and filings, dripping or splashing liquids so destructive to open type motors.
Write or wire today for literature. Prompt attention to all inquiries . . . PROMPT DELIVERY on orders.
Large enough to successfully serve you, yet small enough to give personal attention to your needs.
ELECTRIC LIMA MOTORS
DRIP-PROOF 1 to 75 HP
THE LIMA ELECTRIC MOTOR CO.
OFFICES - NEW YORK - CHICAGO - DETROIT
LIMA, O. U. S. A.
EXPLOSION-PROOF 1 to 5 HP
POLISHING LATHES
OPEN
VERTICAL
TOTALLY-ENCLOSED

Quick Changes on Van Norman

RAM-TYPE MILLING MACHINES



When the operator has completed a horizontal cut on a Van Norman Ram-Type Miller, and wishes to proceed to an angular or vertical cut . . . *he does not need to touch the set-up on the table.* All he has to do is unclamp the swiveling cutterhead, swing it to the required position, reclamp . . . *and start the next cut.* Only a matter of moments, compared with the time needed to reset the work. And one of the greatest sources of errors is completely avoided. This exceptional ease and convenience of operation provide gains in time, accuracy and output. So today, throughout America's war industries, Van Norman Ram-Type Millers are delivering the goods in great plenty . . . and in plenty of time.

VAN NORMAN
Machine Tool Company
SPRINGFIELD, MASSACHUSETTS

In June, 1942, Van Norman was awarded the Army and Navy E in recognition of its war production record

discussed the requirements and advantages of forming a Chapter of ASTE in that city.

Not at all discouraged by the requirement that there shall be fifty members in good standing in a community before a request for a charter shall be considered, this group indicated that this should be easily accomplished and has organized to secure many more than this number of applications for membership.

Bowser, General Electric, Magnavox and Fries Tool were represented at the meeting. Cyril Grindod of S. F. Bowser Company, Inc., is organizing Chairman, and Paul R. Weitzman, of General Electric, is organizing Secretary. Applications may be had from either of these men.

Executive Secretary Adrian L. Potter attended the meeting and collaborated with Director Wentzell in outlining the prerequisites and advantages of membership in ASTE.

Clinic for Chapter Officers

A Chapter Officers Clinic was held Sunday morning, October 18, following the War Production Conference at Springfield, Mass. Executive Secretary Adrian L. Potter presided at this meeting which was attended by 30 Chapter Officers.

MEMBERSHIP . . . Discussed from various angles . . . plea for closer cooperation in the matter of address changes to enable the Society to furnish the members with prompt and complete service . . . agreed that the Constitution will be followed accurately as concerns membership requirements which should be interpreted intelligently, bearing in mind that there is no uniformity in titles used in various plants . . . urged that more effort be made to contact desirable executives, distinguishing between those with productive skill and those with managerial ability. By getting in "the man at the top," the ones down the line will follow.

PROGRAM—Past President Frank W. Curtis compared the operation of a Chapter to the operation of a business, the program as the product which will sell if it is good, and the Publicity Committee as the Advertising Department. A good show is necessary to attract and hold good members—more members . . . more money —more money . . . better programs.

Strongly recommended that more motion pictures be used and that the Chapters should purchase projection equipment as soon as available, since a season's rental would almost pay for a machine.

Desirable to have more than one person work on program planning. The Program Committee should co-operate with the First Vice-Chairman for best results, with the physical work being co-ordinated among the members with the precision of a production line. It was suggested that the Program Committee Chairman be appointed rather than elected.

PUBLICITY — One of the first tasks of a Publicity Committee is to familiarize newspapers with "Tool Engineers." News must be dramatized in such a way as to be interesting to the general public, since newspapers cannot use technical data. The Publicity Committee should work through the

(Continued on page 212)

SURFACE PLATES TO MEET TODAY'S PRECISE REQUIREMENTS IN INSPECTION

PRECISION SCRAPED

Increasing production is placing greater responsibility upon inspection. This in turn is making greater demands for Machine Products Surface Plates because of their recognized precision quality.

Made of Meehanite—an unusual wear-resistant material of dense, uniform grain structure—these plates have a smooth, flawless surface. The extra heavy top supported by scientifically-designed ribs assures absolute rigidity and strength throughout the entire plate area.

ALSO ANGLES AND CUBES

Like the surface plates, these angles and cubes are made of Meehanite and possess the same high quality of precision. The angles have well-formed grips which facilitate handling.

MACHINE PRODUCTS CORPORATION • 6775 EAST McNICHOLS ROAD, DETROIT, MICH.

We trimmed its waist-line

and made a better, simpler stud setter

HERE'S a brand new setter, slick as a whistle, trim as a pencil. It'll get into tight spots with ease and accuracy . . . save vital production minutes in many ways. Its small O.D. and remarkable ruggedness make it a desirable tool for either hand or power operation. Can be adjusted to any desired length of thread on stud in a few seconds. Four sizes cover a range of studs up to 1¼". You can have Morse taper shanks, hexagon, T handle, square female or T handle combination with a square female drive for use with a torque wrench. Types to fit any make of power tool. Made to customer specifications when requested.

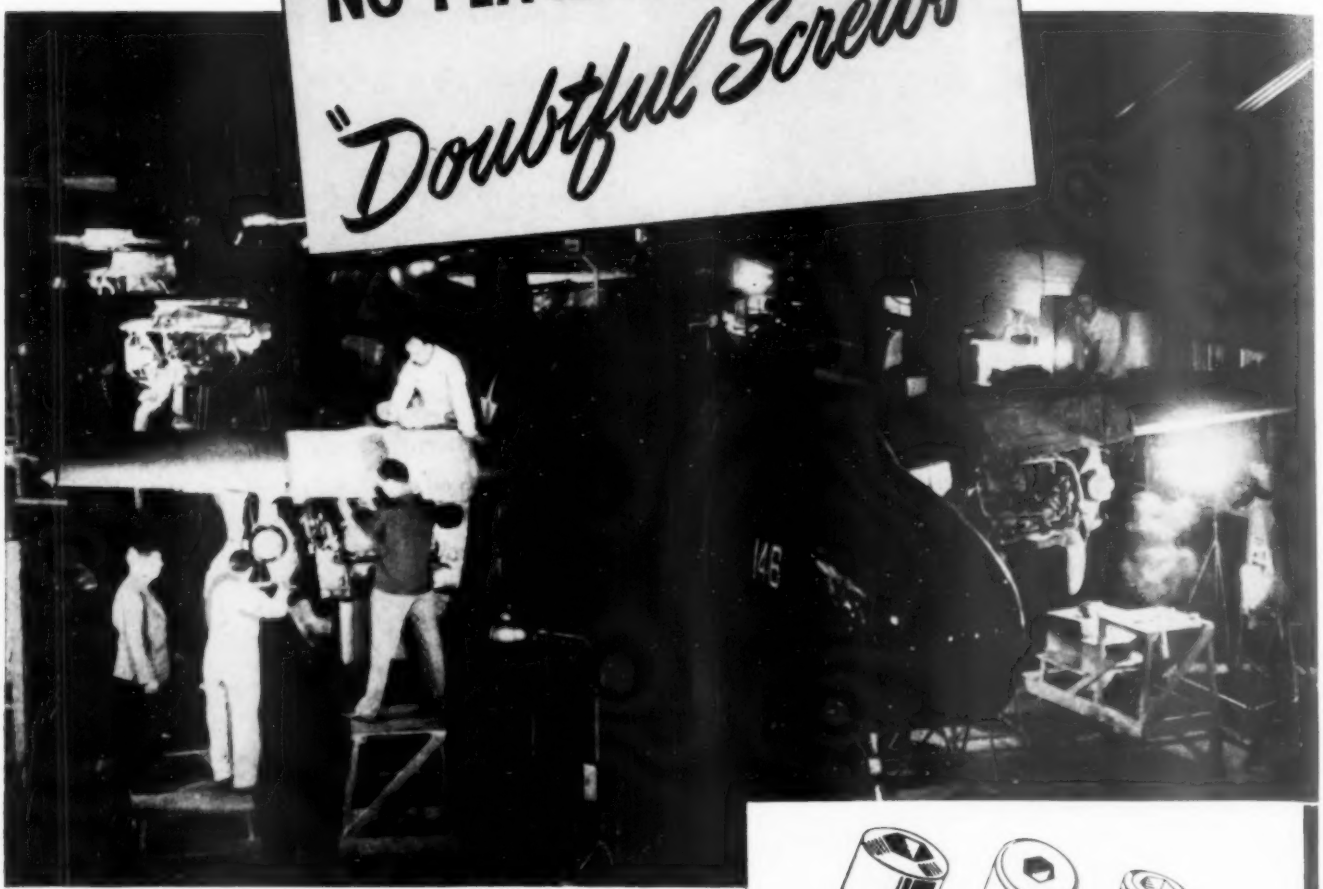
Write for Bulletin No. 101.

APEX

THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Manufacturers of friction tapping chucks, quick change and positive drive drill chucks, vertical float tapping chucks, parallel floating tool holders, power bits for Phillips, slotted head and Clutch Head screws, hand tools for Phillips and Clutch Head screws, aircraft universal joints, plain and universal joint socket wrenches.

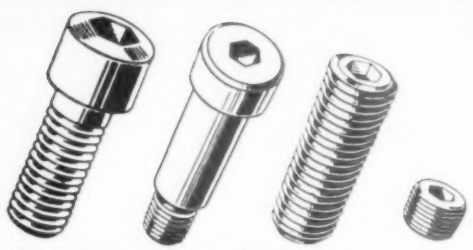
NO PLACE FOR "Doubtful Screws"



-In Fighting Equipment that Must "Take It"!

Allies and enemies alike express amazement over the amount of punishment that American planes and combat cars will take. American engineers and production men have disproved any idea that they couldn't build fast and build well, too. While they've put on night shifts . . . speeded-up in a thousand ways . . . they've refused to take chances with "doubtful materials". And, in their insistence that every integral part must conform to rigid standards, lies the reason why Parker-Kalon Quality-Controlled Socket Screws are "on the preferred list" of so many makers of planes and engines, combat cars and trucks.

P-K Socket Screws have the extra dependability that severe service requires. "Doubtful screws" . . . screws that *look* all right but some of which fail to *work* right . . . are eliminated by the unequalled quality-control routine of the Parker-Kalon Laboratory. This assurance covers all physical and mechanical characteristics . . . yet P-K Screws cost no more. Parker-Kalon Corp., 190-198 Varick St., New York.



"Quality-Controlled" means . . .

Complete test and inspection covering; Chemical Analysis; Tensile and Torsional Strength; Ductility; Shock Resistance under Tension and Shear; Hardness; Head diameter, height and concentricity; Socket shape, size, depth and centricality; and Thread fit.

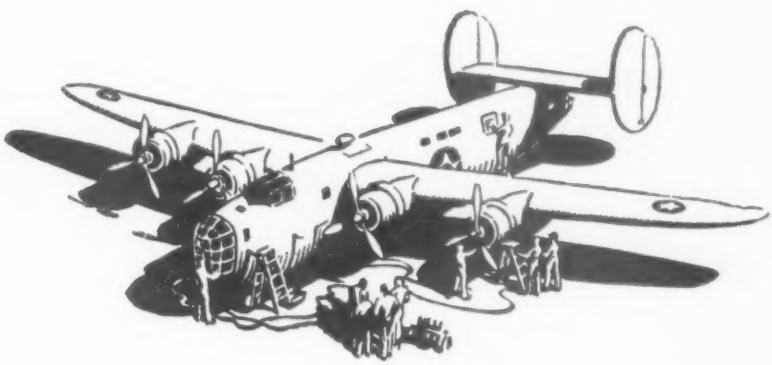
PARKER-KALON

Quality-Controlled

SOCKET SCREWS

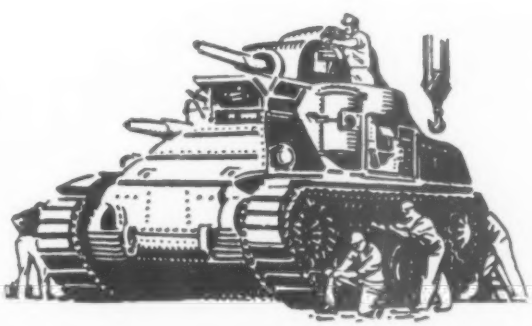
Give the Green Light to War Assemblies

Tools to win this war!



Bombers, tanks, ships, fighter planes — in fact, all pieces of war equipment, big and small — require *good tools* for maximum production. A dependable, constant supply of sharp, efficient tools is absolutely necessary to accomplish this tremendous production job in the shortest time possible.

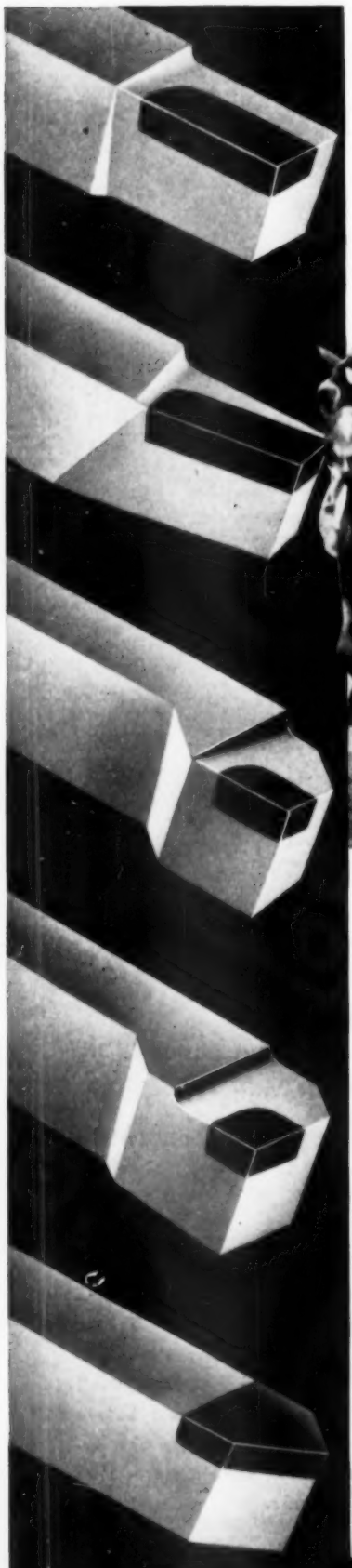
Check up on your tools regularly. Make certain that they are kept in top-notch shape through periodic reconditioning. Do this to insure your maximum capacity for war production.



Our engineers are skilled in solving tool problems. Let them show you how to decrease your tool costs. Don't scrap a single tool before you consult with us. Our experience covers more than 30 years.

A COMPLETE RECONDITIONING SERVICE FOR TOOLS

EASTERN CUTTER SALVAGE CORPORATION, 30-32 LITTLETON AVE., NEWARK, N. J.
Western Plant · MASTER TOOL CO., INC., 5605 HERMAN AVE., N. W., CLEVELAND, OHIO
Chrome Plant · MASTER CHROME SERVICE, INC., 5709 HERMAN AVE., N. W., CLEVELAND, OHIO



They may all start together— but they don't stay together!

EVEN though all carbides may look alike to a user in the beginning, eventually one manufacturer's will nose out in front of the others in his estimation. This is especially true in the fast production race of today, when even a slight difference in cutting qualities may mean a substantial increase in the user's output.

There are, of course, definite differences among carbides, based on the inevitable human element in their production. Length of experience . . . rigidity of control in grinding, mixing and sintering . . . skill in tipping and grinding . . . strictness of inspection—all these have their effect on the finished tool.

Many of the most prominent metal-working concerns in the country are convinced that TECO CARBIDE TOOLS hold their cutting edges longer, cut at higher speeds and produce more pieces between grinds than any similar material. And a recent increase in our facilities, tripling our output of carbides and doubling our tool production, enables us to offer exceptionally prompt shipment of orders.

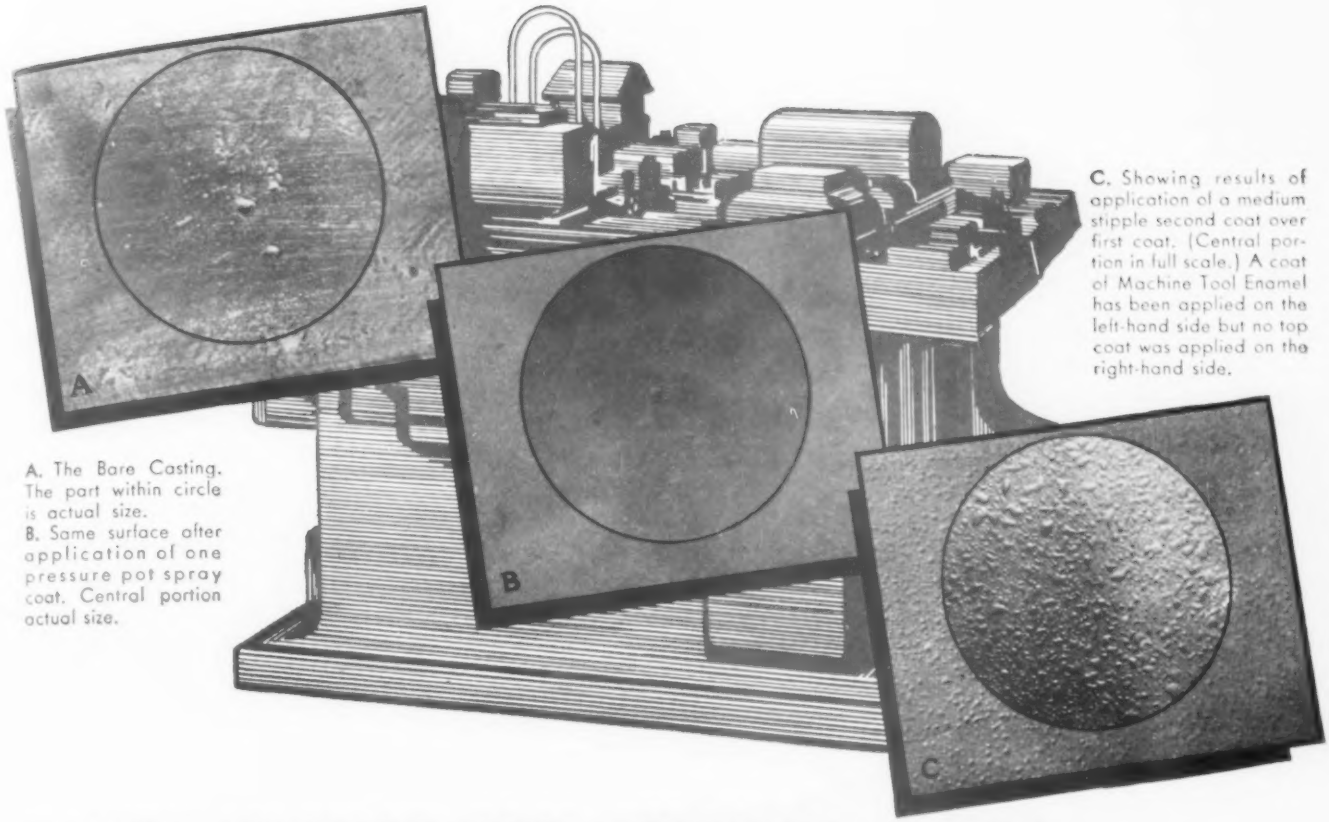
TUNGSTEN ELECTRIC CORPORATION • 570 39th St., Union City, N. J.

Branch Office: 2906 Euclid Avenue, Cleveland, Ohio

Representative: Architects and Builders Bldg., Indianapolis, Ind.

Pioneers in Tungsten Carbides for over a Quarter Century

TECO CARBIDE TOOLS



A. The Bare Casting. The part within circle is actual size.
B. Same surface after application of one pressure pot spray coat. Central portion actual size.

C. Showing results of application of a medium stipple second coat over first coat. (Central portion in full scale.) A coat of Machine Tool Enamel has been applied on the left-hand side but no top coat was applied on the right-hand side.

A NEW MACHINE TOOL FINISHING SYSTEM FOR PRESENT HOUR NEEDS

Here's a NEW machine tool finishing system which is entirely consistent with WPB Limitation Order L-108. Designers, finishers and customers are enthusiastically endorsing it wherever it is used.

It's a three coat system which produces a stipple effect, minimizing those rough spots found in every casting by blending them with the rough finish.

It can also be used for a smooth finish where desired since it gives a maximum of filling and smoothness to castings consistent with a complete spray job.

Here are the high lights of the NEW EGYPTIAN Machine Tool Finishing System.

1 FAST, AIR DRYING Lacquer materials.
2 No Primer required.
3 Oil and alkali resistant.
4 Applied by spray or brush.
5 Finish levels or rounds out as it dries.
6 Gives stipple effect in two coats. A coat of EGYPTIAN Machine Tool Enamel completes the job.
7 Any make of Stipple equipment may be used. Spray equipment manufacturers can furnish suitable accessories to go with equipment for proper application.

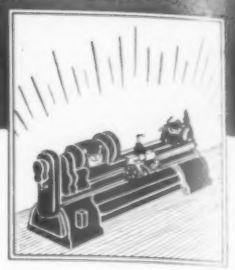
Ask us for detailed information about the new EGYPTIAN Machine Tool Finishing System . . . or better still let us ship you a trial order at drum prices.

Send for this new Gov't "Spec" Book. Contains information concerning specifications for the more important finishes used on equipment for all branches of the Service. Just ask for "Spec" Book TE 12

THE EGYPTIAN LACQUER MANUFACTURING CO.
ROCKEFELLER CENTER—NEW YORK, N. Y.

EGYPTIAN
Superior FINISHES

NEW EQUIPMENT, Materials, Processing



T.M. REG. U.S. PAT. OFF.

DRILLING AND BORING MACHINE (J29)

Designed to bore or drill two parts simultaneously in completely independent cycles, this independent, 2 spindle, deep hole drilling and boring machine manufactured by the W. F. and John Barnes Company of Rockford, Illinois, is called the 445. One leading feature is that each workpiece is driven by independent headstocks and supported by separate steadyrests.

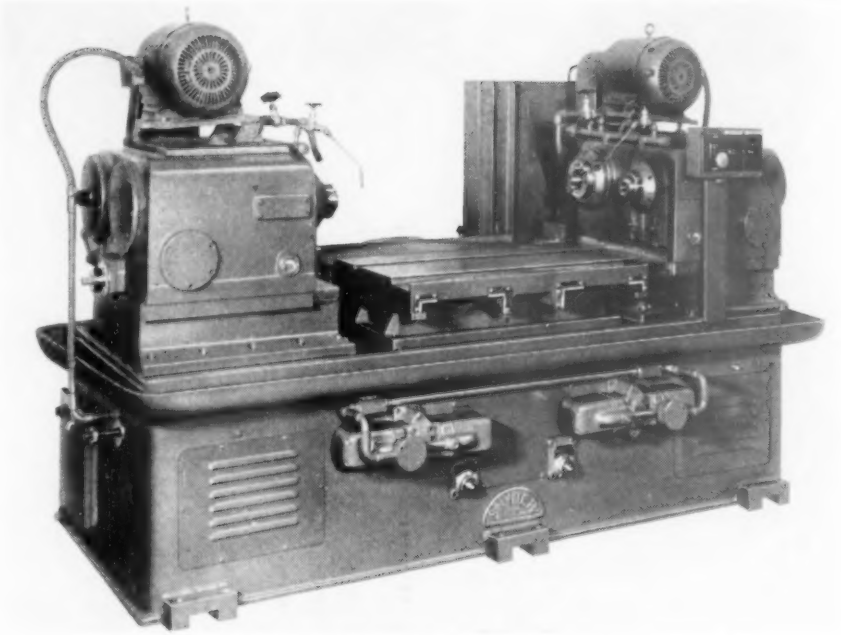
Tools are fed by independent hydraulically actuated slides. It is said that chucks up to 24 inches in diameter may be used with this machine, however, it is normally furnished with a 4-jaw independent type chuck, 15 inches in diameter.

The base is cast in two sections and has three ways that run full length. To clamp the headstocks and steadyrests to the ways, the head section of the base is provided with tee slots which are milled into the center way. Other sliding members are clamped to the 2 outside ways by gibs which are bolted to the underside of each member. Headstocks can be positioned at any place along the head base by loosening the tee slot bolts and the clamp gibs.

Other features of this machine include complete control from each of the 4 pushbutton stations, motor-driven high pressure coolant pumps for each spindle, motor-driven hydraulic feed and traverse units actuate the hydraulic feed cylinders, and steadyrests of the 3-point roller type with adjustment on each of the rollers. Springing of tool shanks at the start of the work cycle is said to be prevented by guide bushings in whip supports.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 173.



New Heavy Duty, Double End Facing and Centering Machine
Quill of the centering spindle has hydraulic feed.

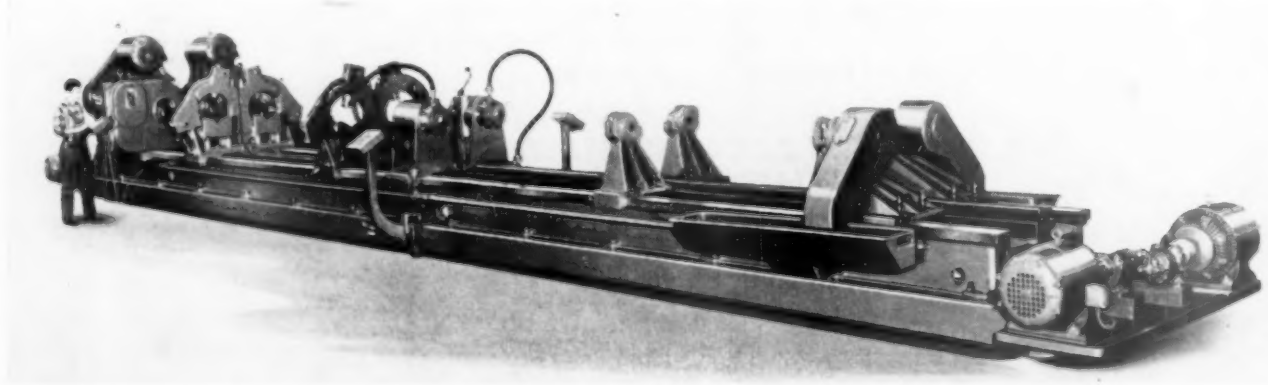
DOUBLE END FACING AND CENTERING MACHINE (J30)

A heavy duty, double end facing and centering machine has recently been developed by Snyder Tool & Engineering Company of Detroit. The standard sizes of this new machine tool will take work lengths ranging for 12 to 20 inches, 20 to 28 inches, 28 to 36 inches, and 36 to 44 inches. Consisting of two units equipped for milling and centering, the machine has a milling spindle that is provided with a No. 50 National Machine Tool Builders' standard taper. Worm driven, it is mounted on Timken roller bearings.

The quill of the centering spindle has hydraulic feed and the spindle is ball bearing mounted. An oil pump and inbuilt reservoir lubricate all moving parts in the unit. Hydraulically operated and electrically controlled, this machine has a cutter range for milling of 3 to 8 inches and the center drills may range from 5/16 to ¾ inch.

In operation, the part to be worked is located and clamped into the fixture.

(Continued on page 175)



W. F. and John Barnes New Drilling and Boring Machine
Bores or drills two parts simultaneously in completely independent cycles. Each workpiece is driven by independent headstocks, supported by separate steadyrests.

FREE INFORMATION and SERVICE

Request the information and service you desire and keep your library up-to-date . . .

THREE FREE SERVICES . . . WITHOUT OBLIGATION

For your convenience, these three business reply cards enable you to request quickly . . .

1 New catalogs—bulletins listed in this issue.

2 Additional information or bulletins relative to new equipment—new materials or new processes.

3 When answering advertisements, specific information on problems or company representative's call.

HOW TO ORDER

Simply fill out the card, indicating the information or service you desire, and mail. Be sure to write, in the square, the identifying number of the catalogs or bulletins covering new products described. In answering an advertisement, include the name of the advertiser and indicate by a cross if literature is desired or if company representative should call. No stamp is required.

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USE THIS CARD for requesting new catalogs and bulletins listed in this issue.

2

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3

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Request for additional information and catalogs covering

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ANSWERING ADVERTISEMENTS

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REPRESENTATIVE
TO CALL

The cycle start button is then pressed and the fixture and slide move in rapid traverse away from the operator and feed the work between the two milling cutters. The slide returns to the loading position when the work is faced to length. The centering tools are then fed into the work and the cycle is completed upon the return of the centering tools to start position.

SUPERFINISHING MACHINES (J31)

The Foster Division of The International Machine Tool Corporation at Elkhart, Indiana, recently announced improvements on their 4x18 inch superfinishing machine and an addition to this line of a 4 x 36 inch model. These machines are said to be capable of developing an accurate and fine finish of 2-5 micro-inches on such cylindrical work as shafts used in aircraft engines, where surface scratches and other defects must be eliminated.

By the use of both coarse and fine abrasive stones, these machines are said to be capable of not only producing superfinished surfaces from work that has just been turned, but also will at the same time produce the desired dimensions of the finished piece. Such defects as grinder feed spirals, chatter marks, and grinder flats, are eliminated by these machines.

They have a manually controlled, variable-speed drive to the spindle with a variable-speed drive to the oscillating head. The speed of the longitudinal hydraulic traverse, also provided with the oscillating head, may be varied from 0 to 30 inches per minute. Said to insure perfect alignment of the spindle with the tailstock, the headstock is tongued and grooved to the table. A slinger ring operating in an oil reservoir that is located within the headstock proper provides the lubrication.

Spindle nose is provided with a No. 5 Morse Taper and work holding centers that have a No. 3 Morse Taper are mounted in a sleeve or adapter. It permits the use of a face plate, 3 or 4 jawed chuck, and special work-holding fixtures.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 173.

UNIVERSAL CUTTER AND TOOL GRINDER (J32)

Featuring a heavy box-type bed with the table and saddle mounted directly on the bed and a three point floor bearing, this new universal cutter and tool grinder, recently introduced by Covel Manufacturing Company of Benton Harbor, Michigan, is said to have controls that are handy for the operator because they can be operated from either the front or rear of the grinder.

The accompanying illustration shows the left rear view of the machine. The opened door reveals the 3 speed V-belt spindle drive. Also visible is the 3 speed, power feed V-belt drive (cover removed) to the table. The wet grinding attachment is also shown, including the special grinding wheel guard, splash guards, piping, and coolant tank.

A quick alignment of attachments is claimed by the manufacturer. All attachments are aligned from the edge of the top table and the table has a fine screw adjustment for taper. Increased cross feed capacity results from revolving top table 180 degrees, thus increasing the maximum distance from table to spindle by 3 inches.

Other features include complete dust protection, cartridge-type spindle, spindle lock, and a swing-type adjustable micrometer stop.

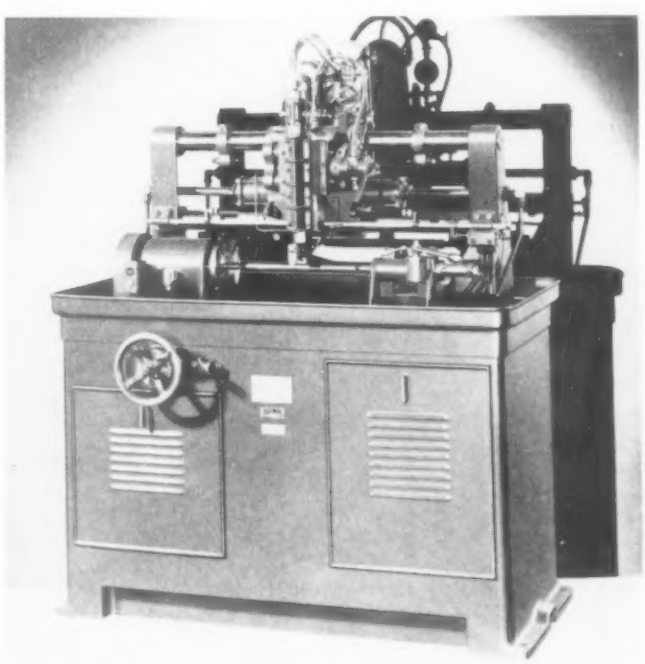
MEDIUM DUTY PLANER (J33)

A new 48 x 48 inch type medium duty planer is now being produced by Liberty Planers, 1005 Weller Avenue, Hamilton, Ohio. One of the features of this planer is a double length bed composed of 3 sections. The center section is standard length while the end sections vary in length to suit the working length of the table. A flange is drilled on both sides for mounting bolts and tapped for leveling screws.

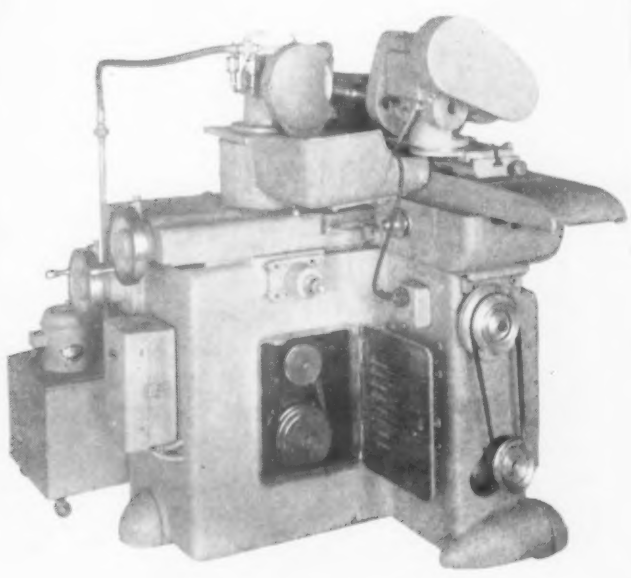
The drive of this new planer is through a triple reduction semi-steel gear train with high speed herringbone primary drive and spur gear secondary and bull gear.

The table is of box-type construction, heavily ribbed, $10\frac{7}{8}$ inches deep through vees. Ample facilities for clamping a variety of sizes of work is claimed

(Continued on page 176)



New Features and Additions to Foster Superfinishing Line
Machine said to produce fine finish on cylindrical work.



Covel Company's New Universal Cutter and Tool Grinder
Table and saddle mounted directly on heavy box-type bed.

because three 15/16 inch T slots for 7/8 inch bolts are planed into table and 1 1/8 inch reamed holes run throughout the entire length of the table.

The cross rail is also of deep box type construction with a 15½ inch face and 12 inches deep at the center. It is said to be rigidly braced at the back and is made of sufficient length to accommodate two heads, allowing either head full rapid traverse across the table.

Another new feature of the planer is an elevating device that is self-contained with integrally mounted motor and is located on the top of the housing cross brace.

WELDING POSITIONER (J34)

Two new giant welding positioners have been added to the line of "C-F" welding positioners, manufactured by Cullen-Friestedt Company, Chicago, it was recently announced. Mounted on a single pedestal which is adjustable for height, they have a table which revolves completely around and tilts to any position up to, or down to, 135 degrees off horizontal.

The positioners are motorized and are controlled by a push button panel so that the welder can position weldments without the help of cranes or handling crew.

The Model 200 has a capacity of 20,000 pounds, 20 inches away from the table, and 8 inches off center. The Model 300 has a capacity of 30,000 pounds, 24 inches away from table, and 18 inches off center.

New Giant Welding Positioner
Has 20,000 pound capacity.

DEEP METAL DRAWING PRESS (J35)

Embodying two hydraulic actions — a 3500-ton downward acting die platen and a 1000-ton hydraulic die cushion in the press bed — this self-contained deep metal drawing press, recently completed by The Hydraulic Press Manufacturing Company of Mount Gilead, Ohio, is said to have a pressure capacity of 3500-tons.

The assembly is locked together as one solid unit through the use of two

(Continued on page 178)

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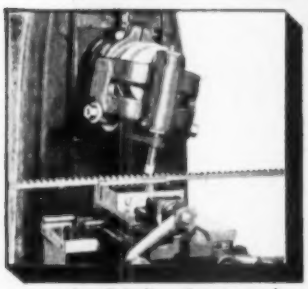
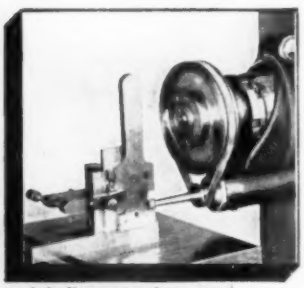
LIBERTY High Speed Grinding Attachments



Grinding clearance of broach teeth.

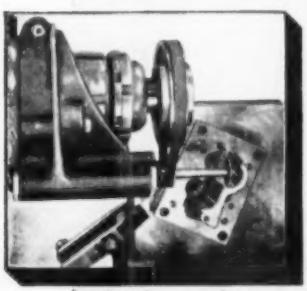


Grinding gage in perfect alignment with other points.

Both horizontal and vertical types are easily attached to most surface grinders for grinding angles, slots, recesses and surfaces which are impossible to reach with large grinding wheels.

For extremely accurate grinding on gages, tools, dies, etc. Assembled complete with any size bores, pulleys, belts and grinding wheels at no extra cost.

Write for details **— specifying diameter of spindle head, type and make of grinder.**



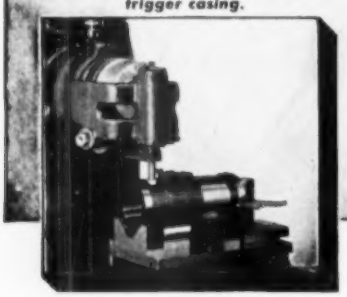
Grinding punch form.

Grinding shoulder on punch.

LIBERTY TOOL & GAGE WORKS

235 Georgia Ave. **Providence, R. I.**

Grinding rectangular opening in trigger casing.



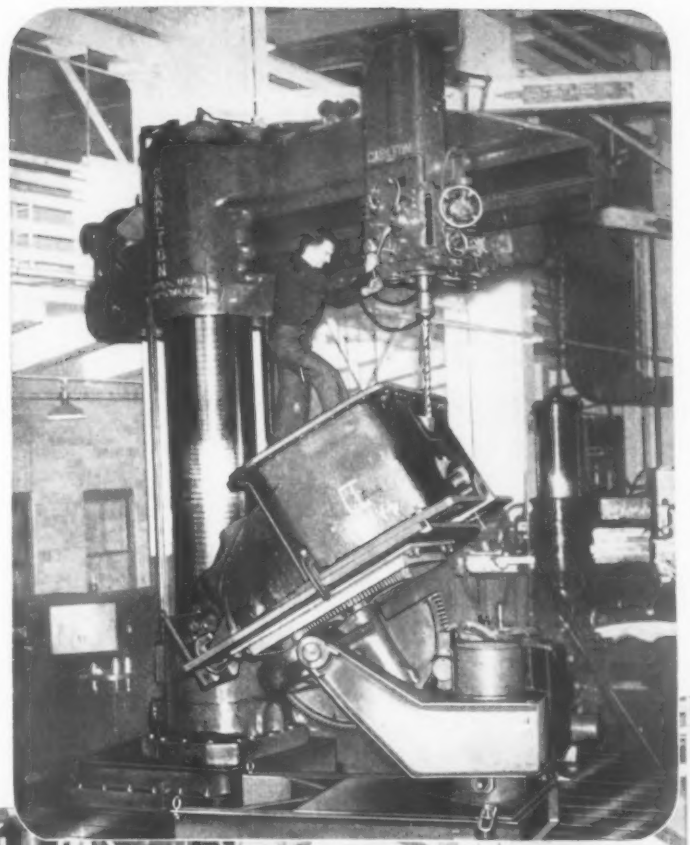
Grinding gaging seat on special gage.

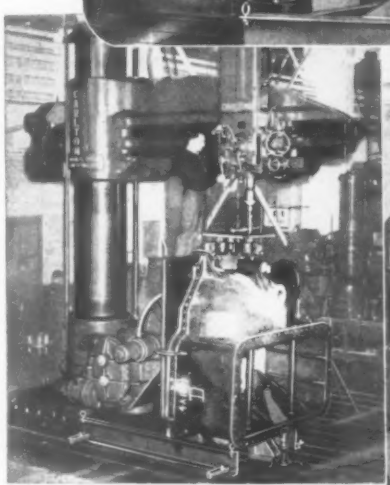
One Set-up on a

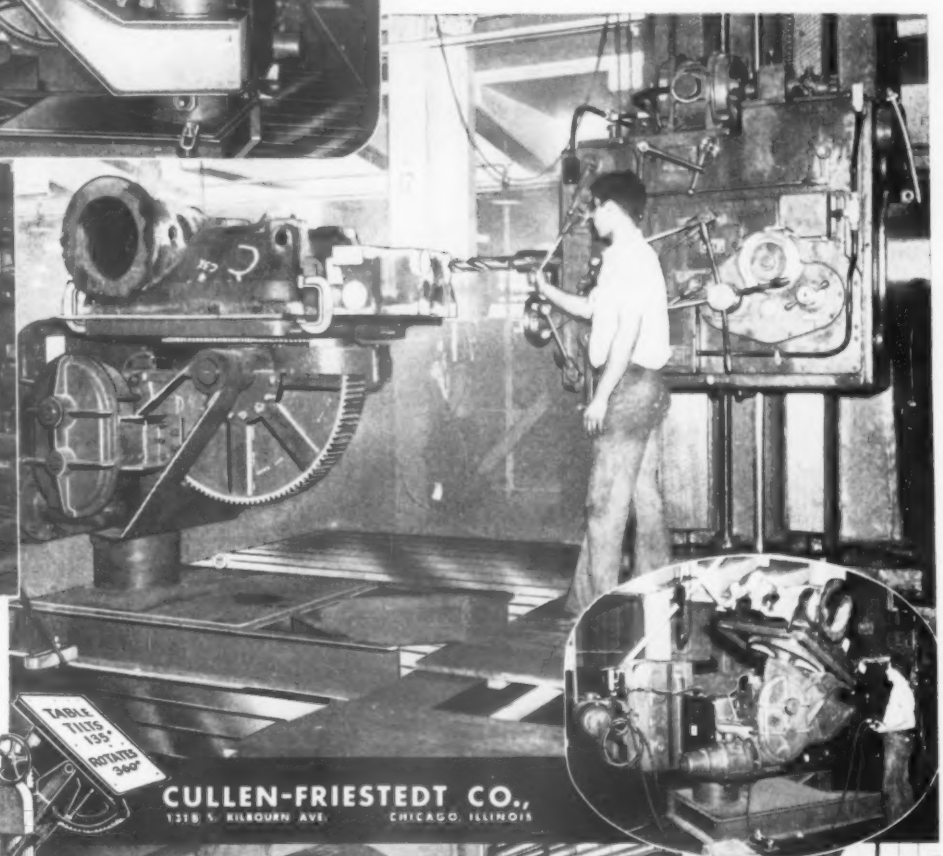
C-F POSITIONER

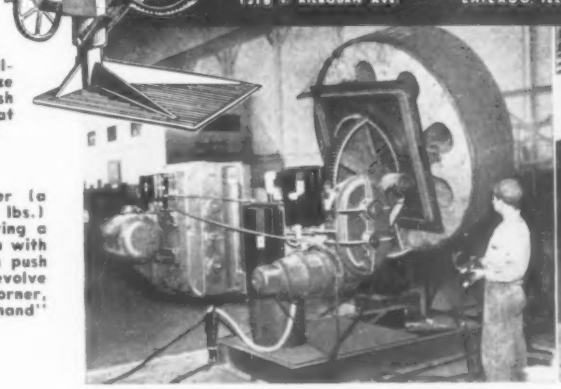
— *permits drilling from all sides, at any angle.*

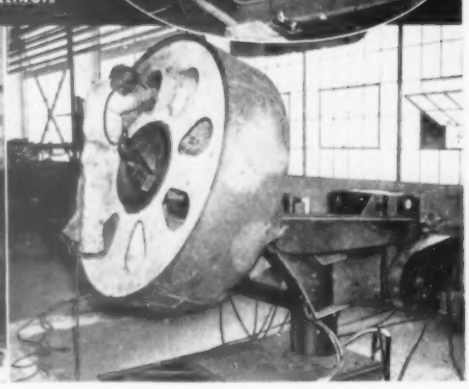
Designed to revolve and tilt weldments so that all sides can be welded "down-hand," C-F Positioners are today being used not only for welding, but for holding and positioning work for many different machining operations. Coming in sizes and capacities to carry work weighing up to 30,000 lbs., adjustable for height and capable of turning or rotating work completely around and tilting it at any angle (up to 135° off horizontal), these versatile positioners are reducing the number of set-ups required for many jobs. For example, in the two jobs illustrated here by mounting these large steel castings on a positioner it is possible to drill holes at varying angles on four sides and the top of the castings ***with a single set-up.***











(At right) Drilling numerous holes (not chalked bosses) on 4 sides of casting with Horizontal Floor Drill and (Oval insert) drilling angle holes in top with one set-up on C-F Positioner.

(Top) Drilling a 2" dia. angle hole with a Radial Drill, in heavy steel casting mounted on a C-F No. 140 Positioner.

(Directly above) Without taking the casting from the bed it is tilted to 90° for "straight" drilling of several holes ranging in size from ½" to 3" dia. With the push of a button, table is revolved so that each side may be drilled in turn.

1 Set-up for All Side Welding
(Right) The same type positioner (a C-F Model 140, capacity 14,000 lbs.) is shown below tilting and revolving a large turbine section. Here, again with one set-up the welder can with a push button control panel, tilt and revolve the giant weldment so each corner, shape and surface can be "down-hand" welded.

CULLEN-FRIESTEDT CO.,
1310 S. KILBOURN AVE. CHICAGO, ILLINOIS

preloaded tie rods or strain rods that pass through the two cast uprights. The frame has a cast steel head and bed. Special circular keys are said to accurately align the uprights with the head and bed.

The head incorporates the hydraulic cylinder with power ram which actuates the main slide. Beveled ways on the four inner corners of the uprights guide the slide through adjustable gibs, so positioned as to oppose any twisting of the slide.

This massive press is said to be capable of deep drawing heavy steel plate to a depth of 18 inches. However, more than one drawing operation may be required, depending on the thickness of the metal and the reduction required. The die cushion press may be operated on varied lengths of stroke and at full pressure capacity for any distance.

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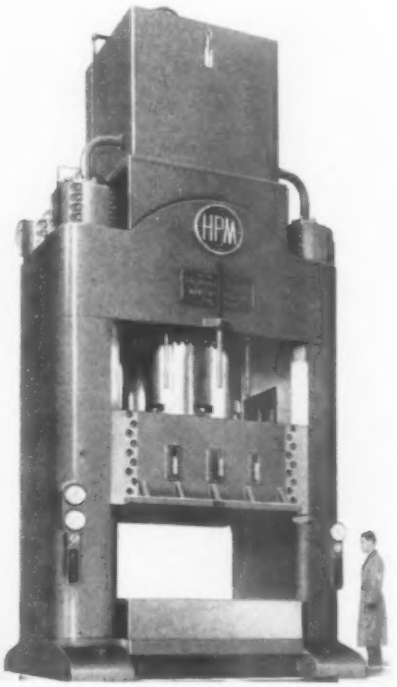


New Deep Metal Drawing Press
Pressure capacity 35,000-tons.

The compound press ram is said to permit the use of two main slide pressure ranges — a medium pressure range to 1000-tons and a high pressure range from 1000 to 3500-tons.

TANKS FOR METAL FINISHING (J36)

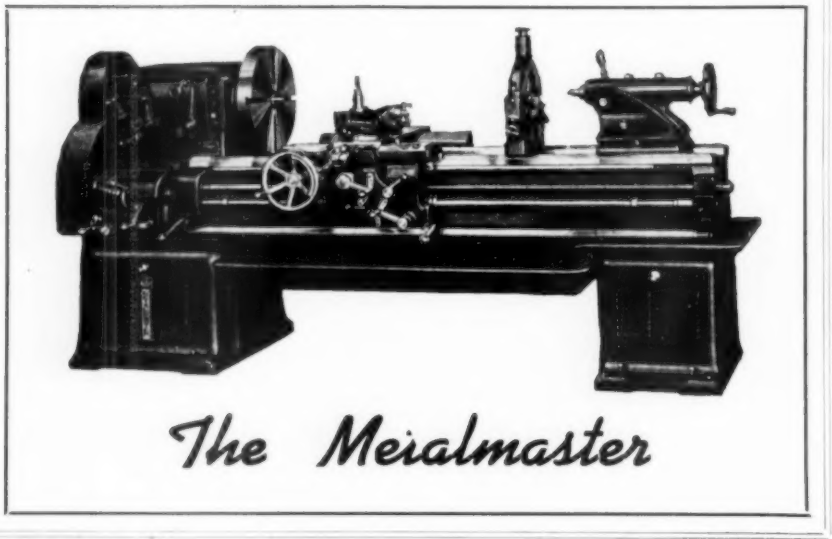
Hot dip tanks for washing metal parts, blackening, or other processing of metal parts are being manufactured by the D. C. Cooper Company, 20 East 18th Street, Chicago. This tank is insulated and is equipped with two dripping baskets, thermometer, scum gutter, draw-off petcock, and a burner for city gas or liquified petroleum. It has a 60 gallon capacity, however, tanks can be made up to fit special specifications.

It is claimed by the manufacturer that all types of steel and iron parts and castings can be cleaned by this tank, removing all greases and oils almost instantly. A cleaner can also be furnished with these tanks. It is known as the D. C. Stripper and is packed in 450 pound barrels.

NEW TAPPING MACHINES (J37)

A new line of precision tapping machines which may be provided with either single or multiple tapping heads has recently been announced by the

(Continued on page 180)



PICTURE OF PERFECTION

Note These Features of This Bradford Lathe

→ Spindles are manufactured from high carbon molybdenum steel forgings bored from the solid stock straight through from end to end.

→ Spindle rolls on heavy duty precision tapered roller bearings, preloaded in accordance with the best engineering practice and easily adjusted.

→ All gears are high quality alloy steel, heat treated, shaved, and lapped to close tolerances for smooth and quiet operation.

→ Twelve speeds in geometrical ratio and in both forward and reverse are available. Direct reading index plate indicates lever positions for all speeds.

ALSO MANUFACTURERS OF DRILLING AND TAPPING EQUIPMENT

THE BRADFORD MACHINE TOOL CO.
EVANS STREET SOUTH OF EIGHTH, CINCINNATI, OHIO
PRECISION TOOLS SINCE 1840

THIS CENTERLESS REGULATING WHEEL made of Saftoid IS REPLACING THOUSANDS OF RUBBER WHEELS

SAFETY

On thousands of Centerless Grinding Wheel machines these new Safety Regulating Wheels are replacing rubber wheels. Saftoid was developed by Safety Research Engineers when they saw the acuteness of the rubber shortage. Saftoid has undergone the most severe tests in plunge-cut and through-feed operations, and has proven economical, long lasting. A better job throughout has resulted.

7 POINTS OF SUPERIORITY
SAFTOID Centerless Regulating Wheels

1. Less dressing is required.
2. SAFTOID eliminates chipping of edges.
3. SAFTOID holds its shape longer.
4. SAFTOID is more economical.
5. Wheels constructed of SAFTOID give 25 to 100% longer life.
6. SAFTOID wheels cost less.
7. Eliminates worry about rubber shortage.

To prove the economy, dependability, and efficiency of the Saftoid Wheels, Safety would like to have you make tests in your own shop on your own machine. Practically all standard sizes are available for immediate shipment. Write, wire, or phone 4651 your requirements today.

THE SAFETY GRINDING WHEEL AND MACHINE COMPANY

SPRINGFIELD, OHIO — SALES OFFICES IN PRINCIPAL CITIES — ESTABLISHED IN 1892

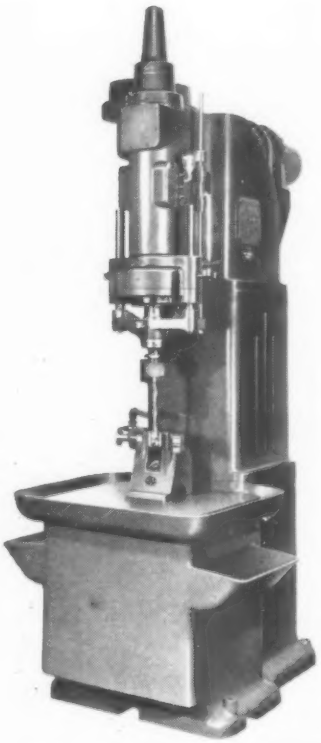
MANUFACTURERS OF SAFETY MOTOR DRIVEN PORTABLE GRINDERS, SAFETY RITE-SPEED GRINDERS, GRINDING WHEELS FOR EVERY PURPOSE, INCLUDING THE FAMOUS "SAFETY GRIP-LOK GRINDING WHEELS"

Detroit Tap and Tool Company, 8432 Butler Street, Detroit. Two types are now in actual use—the light duty and the heavy duty.

Inaccuracies due to lead-screw "wind-up" are said to be avoided because the lead-screw is not required to drive the tap, the tapping spindle being driven at a point between the tap and the lead-screw itself. Maintenance of accuracy, insurance against oversize tapping of holes, and deep hole tapping are claimed because the machines are so designed that the lower end of the tapping spindle is guided through the entire stroke.

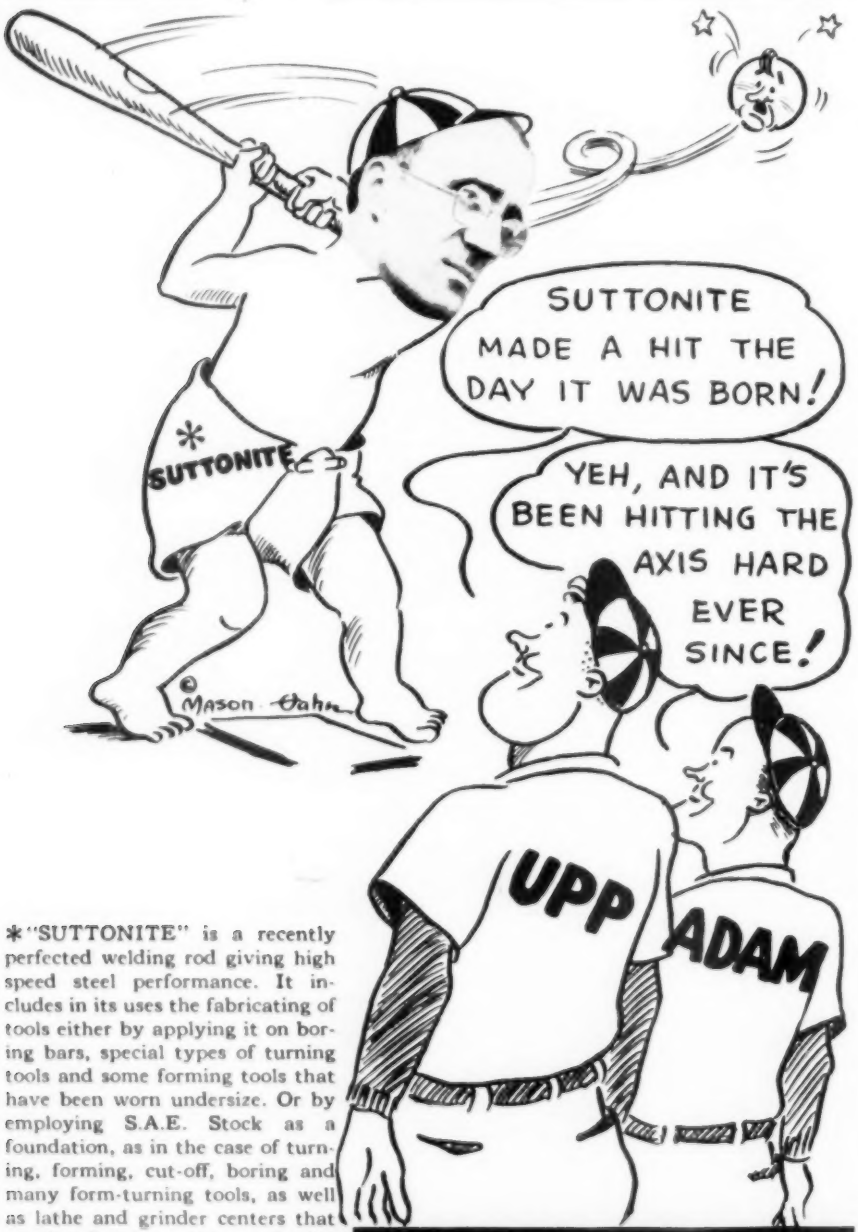
Maximum stroke of the light duty type is 6 inches while the heavy duty type has a maximum stroke of 8 inches. These machines may be used for oil grooving or long lead tapping. The lead-screws are hardened and ground all over. The split bronze nuts in which the lead-screws operate are of exceptional size and are designed so that they may be adjusted to eliminate backlash and to take up for wear.

The light duty type of this tapping machine line is designed for tapping up to 7/8 inch diameter and 14 pitch in steel.



Precision Tapping Machine
Single or multiple heads.

UPP and ADAM *Broadcast No. 1003* • • *by* Mason-Hahn



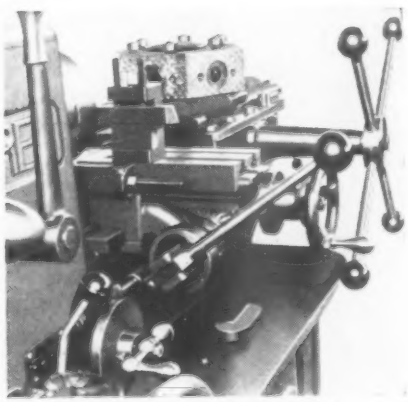
*"SUTTONITE" is a recently perfected welding rod giving high speed steel performance. It includes in its uses the fabricating of tools either by applying it on boring bars, special types of turning tools and some forming tools that have been worn undersize. Or by employing S.A.E. Stock as a foundation, as in the case of turning, forming, cut-off, boring and many form-turning tools, as well as lathe and grinder centers that require abrasive resistance. It also serves many other useful purposes.

Inquiries are solicited on any prospective jobs.

WELDING EQUIPMENT & SUPPLY CO.
223 Leib Street • DETROIT, MICHIGAN

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 173.



New Feature on Morey Lathe
Combines screw and lever cross slide.

NEW CROSS SLIDE FOR LATHE (J38)

The Morey Machinery Company, Inc., 410 Broome Street, New York, announces a recent engineering develop-

(Continued on page 182)

YOUR DISTRIBUTOR

★

PERSONAL ATTENTION

When you want taps, you'll find your local THREADWELL distributor a breaker of bottlenecks — a man who has or can get the taps you want with a minimum of delay — or tell you the reason why — at once. Personal attention to your every problem is the keynote of the THREADWELL organization. Ask the THREADWELL distributor!

★

Sales Agents: Canada — Bridge Machinery Company, Montreal. England — Skylux, Ltd., London.

Threadwell

"TAPS OF DISTINCTION"

are made by the Threadwell Tap and Die Company, Greenfield, Massachusetts, U.S.A., founded in 1902.

ment on their No. 26 turret lathe. This improvement is a quick acting combination screw and lever cross slide that enables the operator to immediately use either type of feed, or the screw feed in combination with the lever feed.

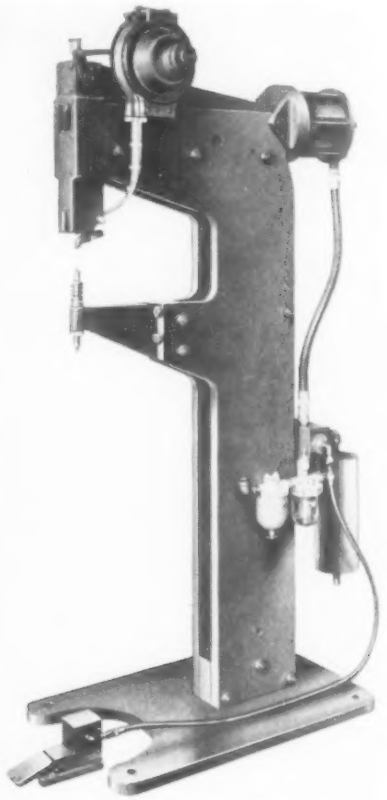
No set-screws for tightening or loosening are employed, just a single quick acting clutch does the work. By one movement, this design is said to allow the operator to instantly select the lever movement to the cross slide, or the screw movement, as his work requires.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 173.

AIRCRAFT RIVETER (J39)

Air powered with automatic feed and setting mechanism, this new riveting machine, manufactured by the Tomkins-Johnson Company of Jackson, Michigan, is said to have been designed



Tomkins-Johnson Aircraft Riveter
Air powered with automatic feed.

to give increased speed and efficiency to flush riveting in aircraft production. Pressure for riveting is furnished by an air cylinder and this pressure is applied by a toggle mechanism.

The use of less critical materials and fewer parts is a feature of its simplified construction. This type of construction is made possible by designing the machine to handle exclusively aircraft requirements for aluminum alloy riveting, with a rivet capacity of ¼ inch diameter and ¾ inch in length.

It is claimed that this machine can also be adapted to handle counter sunk head, round head, full and semi-brazier head rivets by using a different type of rivet set and rivet jaw construction. This is available in throat depths ranging from 9 inches to 36 inches.

Other features are said to be precision setting because the upper and lower toolings are accurately aligned, adjustable setting tools with common variations in material thickness taken care of automatically, and interchangeable horn type construction.

GUSHER PUMP (J40)

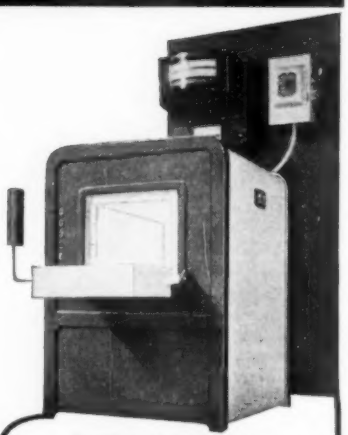
A new vertical 1/10 hp motor driven

(Continued on page 184)

SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate—ideal for small tool and die shops—saves time these five different ways:

1. Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
2. Saves time and expense of drawing or tempering small metal parts in large furnaces.
3. Cuts handling time when normalizing or annealing small parts. No waiting.
4. Conveniently available for pre-heating for subsequent high-speed hardening.
5. Eliminates shut downs and delays in servicing emergency repair orders.



REPLACEABLE HEATING ELEMENTS

Replaceable nickel chromium resistors embedded in rectangular refractory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel — furnace structure remains undisturbed.

AVAILABLE IN TWO SIZES

Type	*Chamber Capacity*	*Amps 115 V*	*Watts*	*Amps 230 V*	*Price*
MH-3	8"W 6"H 14"L	29.6	3400	14.8	$124.00*
MH-4	10"W 6"H 18"L		4300	20.9	$191.00*

**Includes Hearth Plate*

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—$142.40.

FREE—Complete data covering specifications, additional applications and ordering instructions are included in this new folder. Write for your copy today. Ask for Bulletin No. 50.

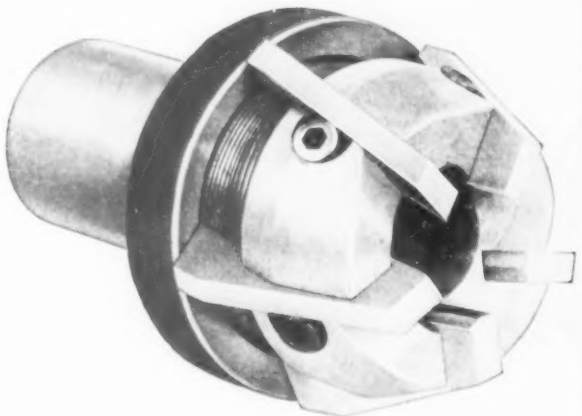
COOLEY ELECTRIC MANUFACTURING CORP.
209 S. SENATE AVENUE • INDIANAPOLIS, IND.

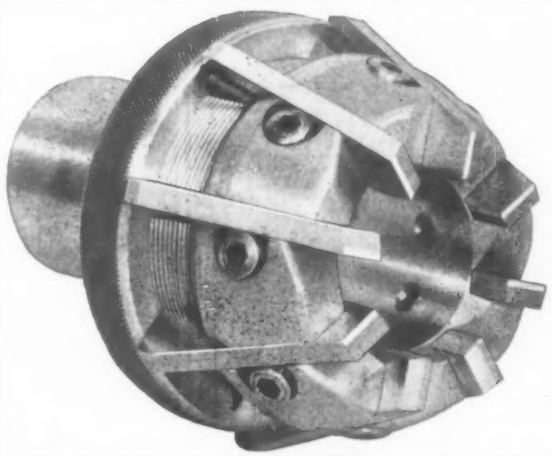
GENESEE

ADJUSTABLE HOLLOW MILLS

ARE BREAKING PRODUCTION RECORDS NOW- JUST AS IN WORLD WAR 1 . . .

Backed by 35 years experience, our entire facilities are devoted to the manufacture of inserted blade Genesee Adjustable Hollow Mills; Facing and Counterboring Tools and Special Production Tools.

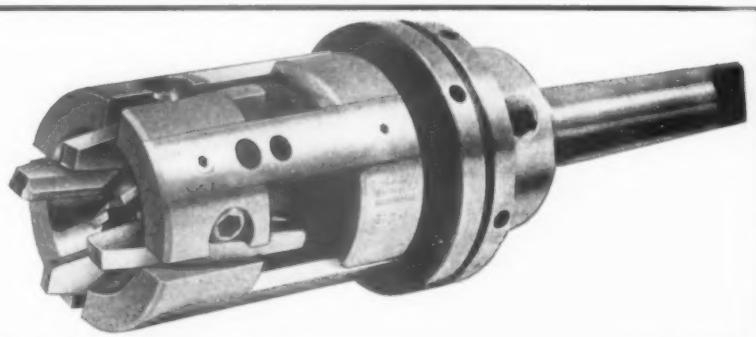




Our standard line of Hollow Mills includes 16 styles and sizes from 0 to 2 inches; larger sizes upon request.

WRITE FOR COMPLETE CATALOG NO. 42.

Backed by long years of experience, our Engineering Department is always ready to assist you in Special Production Tool problems.



GENESEE MANUFACTURING CO., INC.

MANUFACTURERS OF

GENESEE PRODUCTION TOOLS

ESTABLISHED 1908 ROCHESTER, N. Y., U. S. A.

Gusher coolant pump, called the 5-P3, has recently been developed by The Ruthman Machinery Company, 1819 Reading Road, Cincinnati. Having a capacity of 10 gallons per minute through ½ inch pipe at 5 foot head, this pump is made with discharge relation available either right or left hand.

The mounting flange is larger and is interchangeable with larger size Gusher pumps. This has been done to meet possible changes in working conditions or in the type of machine production and applies to installation on new machine tools as well as machine tools already in service. This mounting flange and impeller housing are cast in one piece.

Packing and metal contacts have been eliminated. The seal between the motor and the pump has been accomplished by the use of "lubri-sealed" ball bearings in direct conjunction with a centrifugal slinger. Driving motor is a full ball bearing type with a one-piece suspended shaft to the pump housing.

Another feature of this pump is the Ruthman patented twin equalized intake type impeller which automatically cleans out the intake chambers when the discharge line is throttled. This acts as an automatic by-pass and prevents building up of the pressure.

New Gusher Coolant Pump
10 gallons per minute.

BORING MACHINE (J41)

Boring holes from ⅜ inch in diameter to 2¾ inches in diameter, a new type bench model boring machine has recently been developed by the Century Engineering Company, 816 West 5th Street, Los Angeles. One feature of this new machine is a quick acting fixture which holds in place parts which have parallel sides adjacent to the hole. This fixture can be removed and other holding fixtures for unsymmetrical parts can be attached to the slide which is air and hydraulically operated.

A small hydraulic metering valve adjusts the feed speeds of the fixture on the slide. It is located near the operating control and slowly moves the fixture with its work toward the boring bar during the boring operation, and quickly retracts it when the operation is com-

(Continued on page 186)

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 173.

★ Established Nineteen Hundred and Thirty-Two ★

SYNCRO

Torpedoes the Axis!

SYNCRO-machined parts for submarines, bombers, tanks, guns, etc., are doing their share in torpedoing the Axis. SYNCRO precision machine tool parts in war plants everywhere are efficiently serving Uncle Sam. Each member of the entire SYNCRO organization is proud of his part in the Victory Program — determined to out-produce the Axis and win the war. Syncro is prepared to handle your special engineering and production problems now — or after the duration.

Complete manufacturing facilities for development of precision machine tool parts — special tools — fixtures — production parts — plug gauges.

SYNCRO DEVICES *inc.*

3265 Bermuda Ave. Ferndale, Michigan

MANUFACTURERS OF PRECISION MACHINE TOOL PRODUCTS

Practical Boring to Limits Like This:

+.0002" −.0001"

PRECISION BORING DATA

PART—End Bracket.

MATERIAL—Cast Aluminum with 1020 Steel Insert.

HOLDING METHOD—Special Fixture.

LOCATION—On Rabbit Fit Dia.

MACHINE—#200 Simplex Precision Boring Machine.

OPERATION—Bore 1.0230" Dia. Hole.

TOLERANCES—+.0002", −.0001".

FEED—1⅞" per Minute.

SPEED—1150 r.p.m.

FLOOR-TO-FLOOR TIME—4 Minutes, including inspection time.

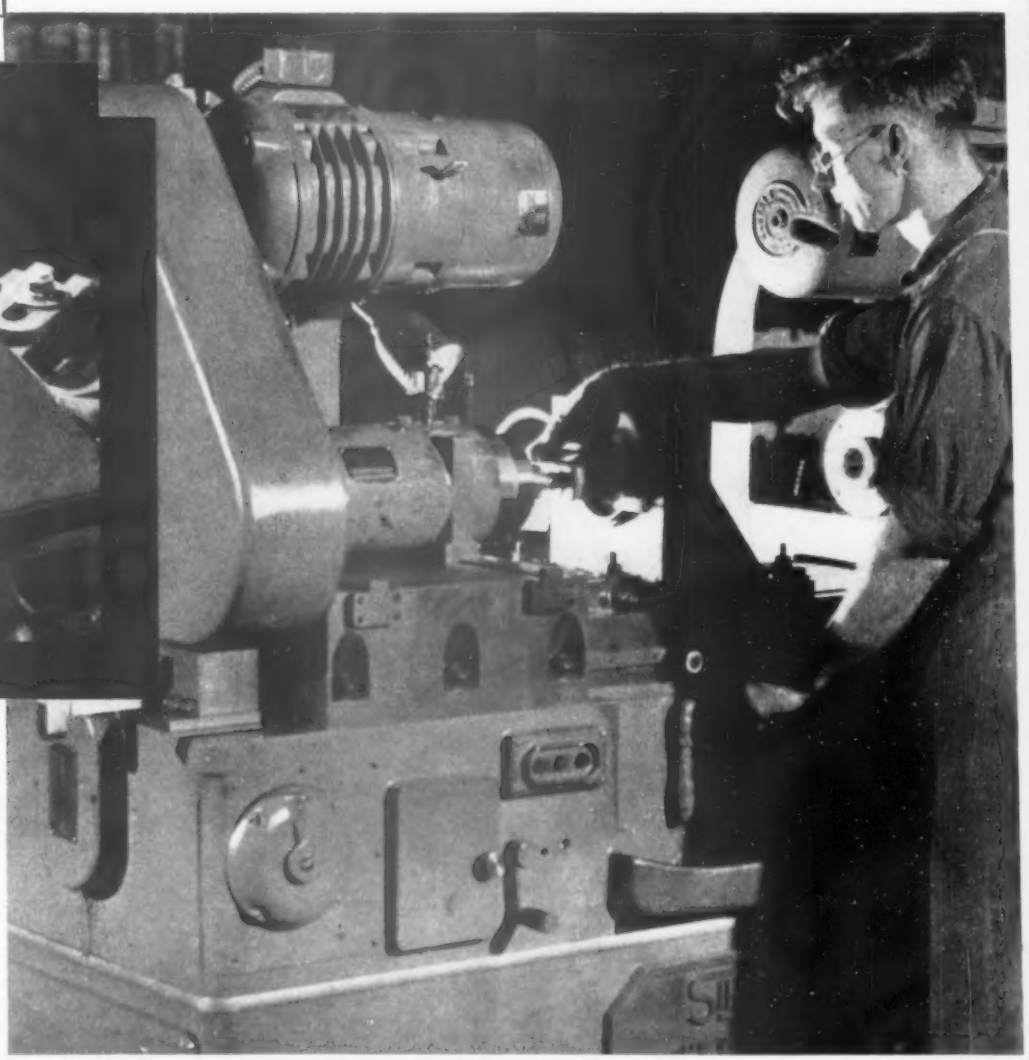
SIMPLEX UNIT-TYPE BORING MACHINES OFFER *Precision, Versatility and Speed*

This Simplex Precision Boring Machine is designed for plants having a number of jobs of varying types to be handled by one machine. The bridges are made so they can be easily adjusted to suit the part being machined. A built-in electric facing control is provided with adjustable dwell.

END BRACKET PRECISION BORED IN 50 SECONDS

In this installation, an end bracket bore is machined to 1.0230" (+.0002", −.0001"). Boring Time is only 50 seconds. Finish is very smooth, and approximately 100 brackets are machined per tool sharpening.

Perhaps one of our 25 different basic models of Simplex Precision Boring Machines will serve you as well. Our engineers will be glad to make a study of your parts and production for faster and better precision boring. Send your part prints and production figures . . . no obligation.



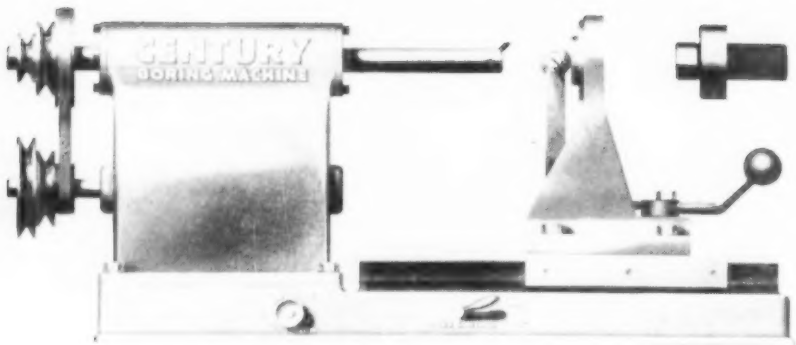
FREE DATA

Write for these two booklets covering our complete line of precision boring machines. Complete specifications of each type are included. Ask for precision boring machine booklets.

STOKERUNIT CORPORATION

DESIGNERS AND BUILDERS OF PRECISION BORING MACHINES AND MILLING MACHINES

4528 WEST MITCHELL STREET • MILWAUKEE, WISCONSIN



A New Type Bench Model Century Boring Machine
Bores holes from 3/8 to 2¾ inches in diameter.

Diamond tools are coming into an increasing use in the War Production effort. The durability and dependability of GILMORE DIAMOND TOOLS has been amply demonstrated in hundreds of industrial plants.

The careful selection of stones by experienced Engineers, the firm setting in nickel-alloy in any holder desired is our guarantee to you of absolute satisfaction. A blueprint of your needs is the first step in producing a tool adequate for your demands.

Write for information today.

F. F. GILMORE & CO.
Manufacturers of Diamond Tools
285 Columbus Ave. **Boston, Mass.**
2834 E. Grand Blvd. **Detroit, Mich.**

pleted.

Housed within the lower portion of the spindle casting, the electric motor that drives the spindle is of 110 volts. A 3 sheave pulley permits changes in spindle speed. Other parts that are standard equipment with this machine include a set of locating plugs and bushings from $\frac{3}{8}$ inch to $2\frac{3}{4}$ inches in diameter, divided in increments of 1/16 inch, to be used with the universal fixture, and 6 boring bars.

INFORMATION FREE
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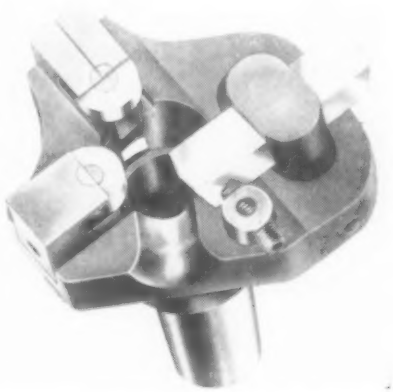
BOX TOOL (J42)

A new screw machine tool, designed to take heavy cuts with sustained accuracy, has recently been announced by Boyar-Schultz Corporation, 2110 Walnut Street, Chicago, Illinois. Delicate adjustments are said to be made with ease on this tool because it has a swivelling tool bit and separately adjusted rollers.



New Screw Machine Tool
Delicate adjustments easy.

Other important factors said to be found in this new tool include rigid construction and a generous amount of space for chips and coolant. This new Boyar-Schultz box tool is called the Model B.

SPOT WELD TESTING MACHINE (J43)

Developed to check the strength of spot-welded samples in the factory, a spot weld testing machine has recently been announced by The Baldwin Southwark Division of The Baldwin Loco-

(Continued on page 188)

AN IMPORTANT SERVICE
that goes with
Ettco-Emrick
TAPPING MACHINES
and MULTIPLE TAPPING HEADS

A good tapping machine or multiple tapping head is only one factor in determining tapping production. To get ***high*** production you must also use (1) a handling method that feeds parts progressively and provides for tapping as many holes as possible simultaneously; (2) a work holder that makes it possible to clamp parts quickly and accurately in position for tapping; (3) the right taps for the job.

That's why the service that goes with every Ettco-Emrick Tapping Machine or Multiple Head is so very important. For that service consists of recommendations to users on taps, handling method and work holder designs,—recommendations that you can depend on, because we've specialized in machine tapping for 25 years and it's our business to know how to handle parts for tapping.

The Ettco-Emrick Foot-operated Tapping Machine is an equally important factor in high production because the skill usually required in tapping is ***built into the machine.*** All the operator does is feed the work and step on the pedal. Even inexperienced operators — men or women — can give you high production on it.

The Multiple Heads add to production possibilities by providing the means for tapping holes simultaneously.

Together, Ettco-Emrick Tapping Machines, Multiple Heads and Advisory Service on handling and work holders, assure you of the maximum production of accurately tapped holes per hour.

WRITE FOR THESE BULLETINS . . .

Bulletin No. 4 gives full details about the Tapping Machine.

Bulletin No. 3 covers the Multiple Heads.

Copies mailed to you on request.

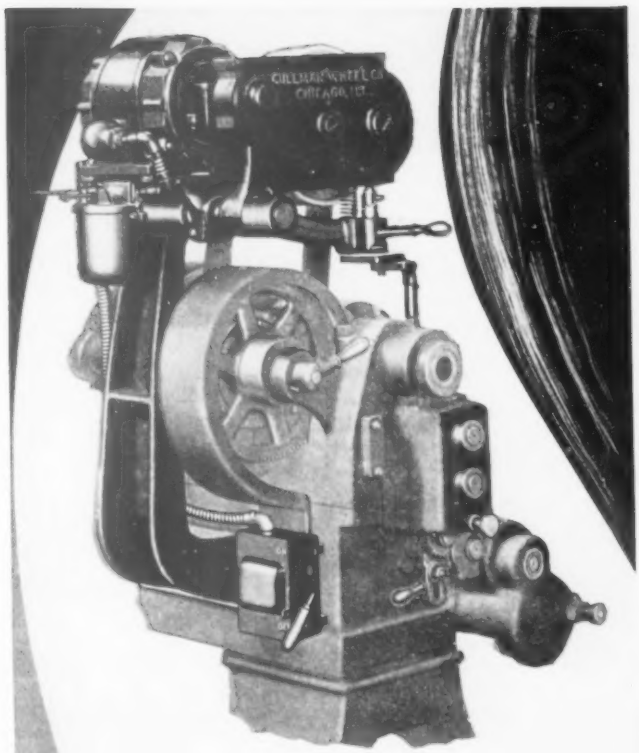
ETTCO TOOL CO.

586 Johnson Ave., Brooklyn, N. Y.

Detroit • Chicago

The Famous *Ettco-Emrick* **DRILL CHUCKS • TAP HOLDING CHUCKS TAPPING ATTACHMENTS • TAPPING MACHINES MULTIPLE SPINDLE TAPPING AND DRILLING HEADS**

Unexcelled for Design, Materials and Workmanship



GO *ALL-OUT* ON WAR PRODUCTION *with* CULLMAN DRIVES

Add 25% to your output from shaft driven machinery by individualizing lathes, screw machines, shapers, punch presses, milling machines, and similar equipment with CULLMAN Motor Drives.

You can have instant control, belt-drive smoothness, and modernized machine units at a fraction of the cost of new machines.

CULLMAN Drives are available for motors ranging in size from ¼ to 15 H. P. Installation is a simple matter---usually requiring only four bolts. Prompt delivery can be made.

CULLMAN WHEEL CO.

1352-R ALTGELD STREET, CHICAGO, ILLINOIS

motive Works. Said to be rapid and simple to operate, this self-contained, motor-driven, hydraulic machine is for use in production line testing of light metal fabrication.

The self-aligning, lever-operated, open face grips with renewable hard file faces are said to accommodate offsets in welded specimens from the smallest gage to ¼ inch thick. No backing plates or liner are needed and the top and bottom handling levers are set at right angles for convenient operation.

There is a hoisting hood at the top of the machine for crane handling and hand moving is facilitated by an 18 inch diameter steel base and a low center of gravity.

Having an overall height of 70 inches and a total weight of about 800 pounds, the machine has an 8 inch precision dial to indicate the load. Cylinders which have a 2 inch stroke are also set in the top section.

INFORMATION FREE

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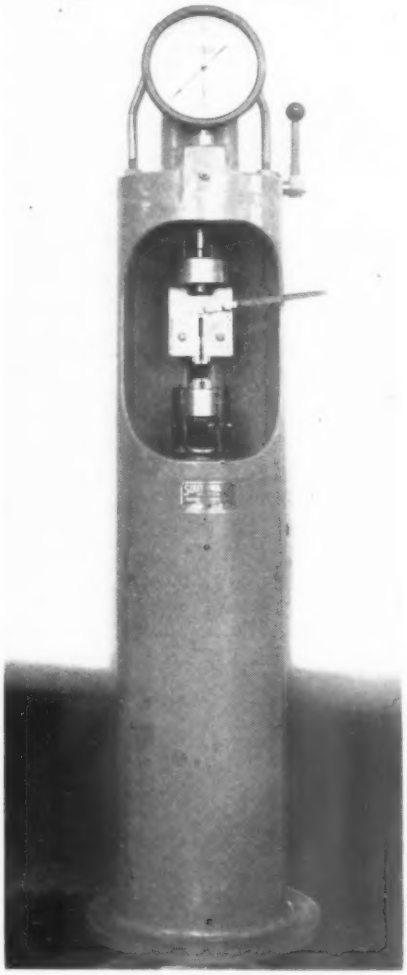
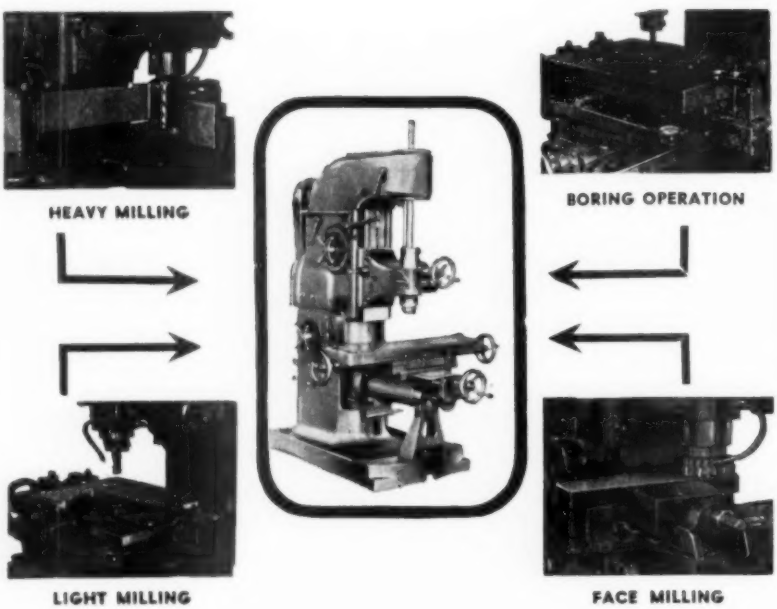


Spot Weld Testing Machine
For production line testing.

VERSATILITY COUNTS!

Here are 4 Operations...
From 1 Machine



THE KNIGHT MILLER

The Knight Miller is versatile because it does light and heavy milling, facing, and boring—and is accurate to the thousandths in every operation! Furthermore, the need of costly fixtures, special angle plates, and angle cutters is eliminated through the use of the swivel and tilting table features. Write today for complete information.

W. B. KNIGHT MACHINERY CO.
3920 WEST PINE
SAINT LOUIS, MO.

36 Years A Builder of Quality Milling Machines

NEW PLATED METAL (J44)

This new metal, recently added to the line of plated metals manufactured by the American Nickeloid Company of Peru, Illinois, is an electro-plated zinc on steel and is said to be a satisfactory substitute for pure nickel, tin, chromium, aluminum, or stainless steel.

Supplied in uniformly pre-finished flat sheets to eliminate the plating of small parts after fabrication, the zinc coating of this new metal is guaranteed against cracking or flaking. The zinc and steel are said to bond well and form a coating that is easily workable in manufacture. It is claimed that it can be bent, stamped, formed, drawn, soldered, and spot welded to meet most produc-

(Continued on page 190)

GLENCO

FLOATING TOOLHOLDER

Corrects Machine Tool Misalignment By Producing TRUE and ACCURATE Holes

Also Manufacturers of

Utility Tools

FLOATING HOLDERS
SPOTFACERS
COUNTERSINKS
REAMERS
COUNTERBORERS
LIVE CENTERS
SLEEVES
TAP CHUCKS
DRILL CHUCKS
ADJUSTABLE ADAPTERS
ADJUSTABLE EXTENSION ASSEMBLIES
QUICK CHANGE CHUCKS
EXTENSION SOCKETS
SPACING COLLARS
ARBORS
END MILLS
WOODRUFF CUTTERS
CORE DRILLS

THE J. C. GLENZER CO.

DETROIT MICHIGAN

▲ *(Above)* **CAMPBELL #250 NIBBLING MACHINE** in high speed aircraft production in a plant in the Middle West. Note 2-hand grip of operator for perfect control.

◀ **CAMPBELL #302 ABRASIVE CUTTING MACHINE** working on hardened slab stock for high speed war production.

the Campbells *have come!*

Campbell Cutting Machines have come a long way—plenty of them are on the job, helping war production plants increase output and get maximum use of floor space.

For example, you'll find **CAMPBELL ABRASIVE CUTTING MACHINES** handling jobs on Aircraft, Aircraft Engines, Crankshafts, and Propellers—on Army Trucks, Cars, and Tanks—on Machine Guns, Bombs, Shells, Projectiles, and Small Arms Ammunition—on Field Telephones.

CAMPBELL NIBBLERS handle sheets to 72" in width and to ½" thick, are instantly adjustable to any thickness; feature speed changes to 350, 500, or 800 R.P.M. and cut in any direction—cutting so clean that work requires little or no finishing.

Ask to have a Campbell Engineer suggest what can be done in your plant. No obligation.

ANDREW C. CAMPBELL DIVISION

BRIDGEPORT, CONNECTICUT

Campbell

CUTTING MACHINES

AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT, CONNECTICUT

tion requirements.

It is said that a galvanic action takes place between the zinc coating and the base metal which gives additional resistance to the corrosion and rust resistance of the metal.

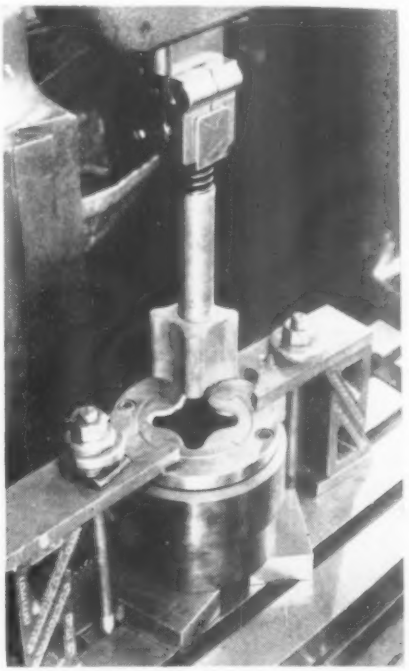
This new zinc plated steel is supplied in sheets, with sizes up to 36 by 96 inches and a full range of gauges and tempers, in polished, unpolished, and satin finishes. Thickness of the coating may be varied to meet individual requirements.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 173.

LAPPING WITH A SLOTTER (J45)

Said to eliminate all of the inaccuracies of hand lapping, a Universal Slotmaster, manufactured by the Experimental Tool & Die Company of Detroit, has been recently used to lap intricate compression dies. This new method is also claimed to be time-saving because it requires a man's time only while setting up the job.



Universal Slotmaster at Work
Laps intricate compression dies.

In this operation, the lapping arbor is mounted in the standard clamper box tool holder of the Slotmaster and is gradually worked into the die opening aided by pressure from a coil spring. The lapping arbor is lowered to the mouth of the die opening and then the down-stroke of the slotter is set so that it will completely compress the spring that is mounted between a shoulder on the shank of the lapping arbor and the tool holder.

The spring then gradually relaxes and the lapping arbor works its way into the opening through the combined efforts of the spring pressure and the stroking of the slotter. This operation is repeated until the full length of the opening in the die has been lapped.

MAGNIFIER WITH LAMP FOR INSPECTION WORK (J46)

Inspection tools that combine magnification and shadow-free fluorescent lighting and are trade-named "Flud-Lite", have recently been announced by Stanley Electric Tool Division, The Stanley Works, New Britain, Conn. Two models are available, one with a steel base and friction joint arms for bench

(Continued on page 192)

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

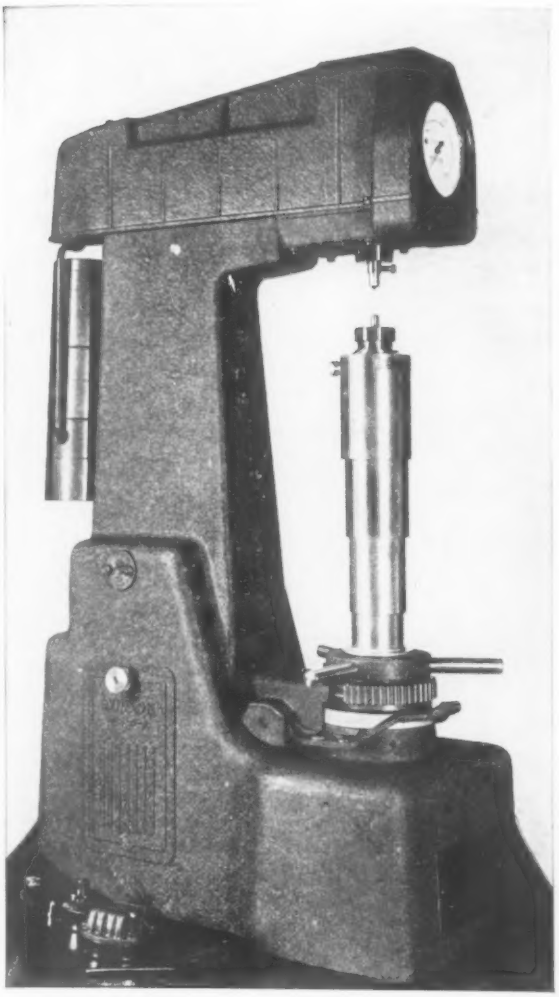
This is our reward... and the symbol of our Promise

ARMY-NAVY "E"
AWARDED TO CUSHMAN EMPLOYEES AND MANAGEMENT SEPTEMBER 4, 1942

We are proud to fly this burgee from the flagstaff of our plant . . . and we are even more proud to know that the fruits of our labors are today helping our old friends and customers in every arsenal of democracy . . . at home and abroad . . . to fashion the tools of victory in constantly increasing volume.

The Cushman Chuck Company, Hartford, Conn.

CUSHMAN
A WORLD STANDARD FOR PRECISION
CHUCKING ENGINEERS • SINCE 1862



"ROCKWELL" HARDNESS TESTER

Exactness:–

Tool Engineers were the men who took precision of measurement, previously used only by physicists in laboratories, and shot it into manufacturing operations.

That is why we take pride in knowing that those same men have shown great confidence in our product. We shall endeavor to continue to justify that confidence.

Concord Ave.
New York

WILSON
MECHANICAL INSTRUMENT CO., INC.

SHIRT-SLEEVE *Trouble Shooters!*

We're up to our necks in trouble these days—that is, other companies' troubles! We've made *their* war production problems *our* problems, and are helping to solve them with a speed and efficiency born of long experience.

Sometimes this involves designing special jigs, fixtures, dies or machinery—sometimes rearranging and revamping plant layout and routing.

But whatever the requirements, skilled McKinney men—engineers, designers and tool makers—team their abilities and experience to effect maximum production in record time.

Our recently expanded facilities and increased personnel now enable us to offer this helpful engineering service to more companies. May we quote on your requirements?

DEPEND UPON McKINNEY FOR:

- ★ Design and manufacture of dies, jigs, fixtures
- ★ Process Engineering
- ★ Tool Designing
- ★ Plant Layout and Routing
- ★ Product Engineering
- ★ Machine Designing

McKINNEY
TOOL & MANUFACTURING CO.
1688 ARABELLA RD. CLEVELAND, OHIO

"DESIGN ENGINEERS FOR TWENTY YEARS"

work, the other with hardwood handle for portable inspection work anywhere in a plant.

Said to be useful for small parts assembly, small instrument manufacture, and inspection of reamers, gauges, punches, and dies, these magnifiers feature a fluorescent daylight lamp which is built into the instrument. Said to be scientifically focussed, this lamp distributes natural light over the work without shadow.

The lens is 5 inches in diameter and has a focal length of 13 inches. It is said to provide full magnified vision and is securely mounted in the magnifier. The base and frame swivel joints and the friction arm joints permit the movement of the lens to a various number of positions. Illustration shows the bench type magnifier at work.

Inspection Work Magnifier
Has shadow-free lighting.

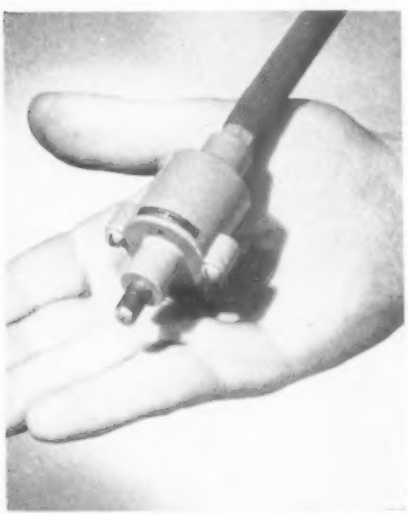
INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 173.

MIDGET AIR CLAMP (J47)

A new midget air clamp, designed for assembly jigs and other multiple applications in the aircraft industry, has recently been announced by Mead Specialties Company, 15 South Market Street, Dept. M-30, Chicago. The compact size of this small clamp is said to be one of its features because it permits installation in corners difficult to reach with larger clamps.

On a line pressure of 100 pounds, this midget clamp delivers 80 pounds of pressure. The ram stroke is 5/8 inch and an internal return spring withdraws the ram when the air is exhausted from the cylinder by the control valve. Action is claimed to be instantaneous.



New Midget Air Clamp
Can work in small space.

All clamps in any set-up, whether two or several hundred, can be operated by a single master valve. Moveover, it is claimed that any desired group of clamps can be controlled independently of any other groups in a given assembly. A typical example would be an assembly where certain primary numbers must be

(Continued on page 194)

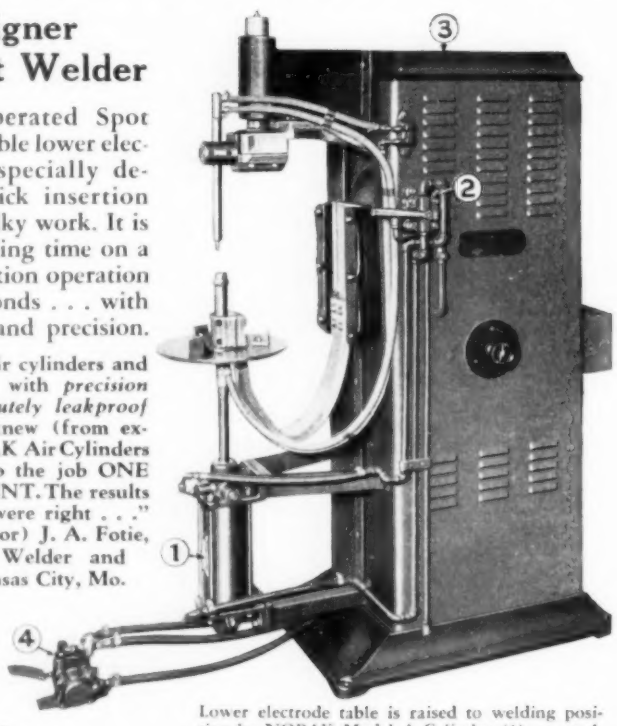
"We knew that NOPAK would do the job 100%"*

. . . says designer of Rex Spot Welder

The Rex Air-Operated Spot Welder, with movable lower electrode table, was specially designed for the quick insertion and removal of bulky work. It is reducing spot-welding time on a certain war-production operation from 50 to 12 seconds . . . with better uniformity and precision.

Read this: — "only air cylinders and valves manufactured with *precision* and *care, and absolutely leakproof* could be used. We knew (from experience) that NOPAK Air Cylinders and Valves would do the job ONE HUNDRED PER CENT. The results obtained proved we were right . . ." (signed by the inventor) J. A. Fotie, President of Dyer Welder and Engineering Co., Kansas City, Mo.

Mr. Fotie's experience suggests how standard NOPAK Valves and Cylinders can help you speed-up machine movements in your plant.



Lower electrode table is raised to welding position by NOPAK Model A Cylinder (1), controlled by NOPAK 4-Way Hand Valve (2). Upper electrode is lowered by NOPAK Model D cylinder (3), inside of housing controlled by NOPAK Model R Foot Valve (4). A successful application of air power to rapid, precise machine movements!

GALLAND-HENNING MFG. CO.
2757 S. 31st St., • Milwaukee, Wis.

Representatives in Principal Cities

***NOPAK** VALVES and CYLINDERS*
DESIGNED for AIR or HYDRAULIC SERVICE

A 3889-1P-A

WOMEN WORKERS *get* Speed and Accuracy

Group of Model G-4's, with belt in horizontal position

With

PORTER - CABLE *Wet-Dry* Belt Surfacer . . .

Model G-4

Vertical position of same machine shown in top illus.

Here's a battery of machines doing second-operation work in a screw machine department — and doing it fast! Women operators can set faster time on all sorts of close-limit jobs with the Porter-Cable Wet-Dry Belt Surfacer — the new belt machining method with machine tool exactness. It takes off burrs and center-tits, removes scratches, squares ends, polishes flats—yet holds the close tolerances and high-quality surfacing required for precision aircraft parts.

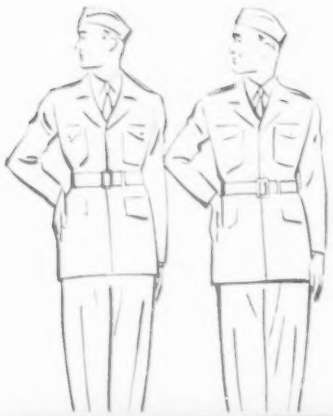
Wet-Belt prevents fill-up, keeps work cool and easy to handle, stops discoloration and dust. And it's the safest possible method for many kinds of grinding operations.

Send in today for your copy of our free new booklet showing scores of applications of this remarkable new surfacing method . . . the first step towards big savings in time and money!

Here's Model G-8 Wet-Dry Belt Surfacer. Does many jobs formerly done on millers, planers, grinders—*ten times faster.*

PORTER-CABLE MACHINE CO.
1610-12 N. Salina St.
Syracuse, N. Y.

See it demonstrated at the
POWER SHOW
Madison Square Garden
New York, Nov. 30--Dec. 4



RIGHT dress

with

Abrasive
"RED BAND" DIAMOND TOOLS

● WRITE DEPT. T FOR LATEST CATALOG AND PRICES

Abrasive
DRESSING TOOL CO.
DETROIT, MICHIGAN

locked up before secondray numbers are laid in. Here each group would be controlled by a separate valve.

WIRE BRUSHES FOR METAL CLEANING (J48)

Designed to clean both the bottoms and side walls in the cavities of various machined, stamped, cast, and forged parts, a new wire brush called the "Sibot" has been recently announced by the Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland.

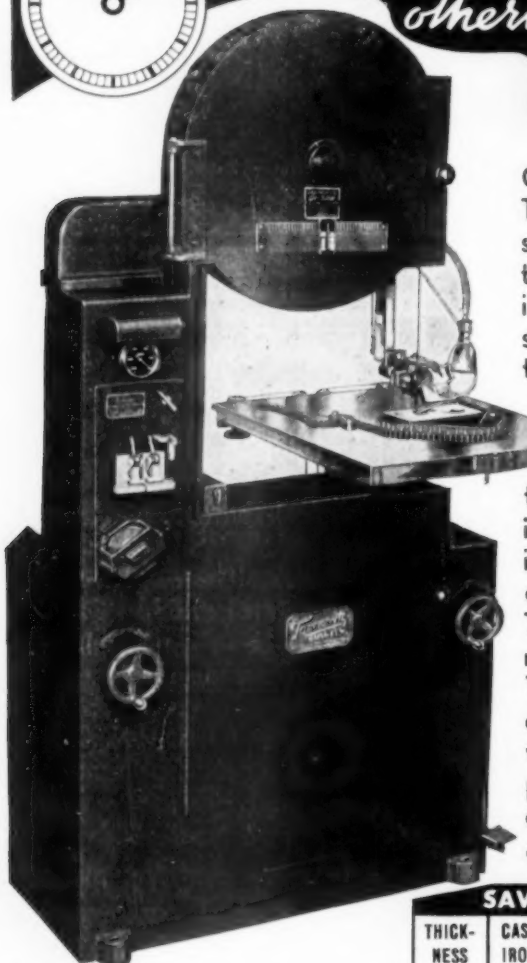
Said to be applicable to fast methods of production and existing equipment, these brushes are used to remove rust, scale, burrs, sharp corners, dirt, and chips from metal holes, cavities, and recesses in one operation. Constructed so that they contact both the side wall and the bottom at the same time, they may be inserted into the chuck of an ordinary drill press for operation.

Uniformity of results is claimed through the use of this brush and it is constructed in such a way that no metal parts extend beyond its working diameter. Brush is made of wire in two ring-lock sections with a metal shank in between. The accompanying illustration shows the brush mounted on a chuck for cleaning a cavity in a metal fuse part.

Metal Cleaning Brushes of Wire
Inserted in drill press chuck.

TANNEWITZ DI-SAWS

Do in **MINUTES** *jobs which otherwise require* **HOURS!**



Conservatively estimated TANNEWITZ DI-SAWS save an average of 70% of the time and cost involved in making inside and outside cuts on dies, shoes, templates and the hundreds of other operations, including filing and polishing, to which these machines are ideally adaptable. In many instances they are turning out work in as little as ONE-TENTH of the former time required.

To expedite production and cut costs, by all means investigate the tremendous possibilities these machines offer in tool and die making and other applications.

The popularity of DI-SAWING is growing by leaps and bounds. Get the complete facts on the most highly developed DI-SAW on the market. Simply write for our DI-SAW Bulletin.

SAWING SPEEDS PER MINUTE					
THICKNESS	CAST IRON	COLD ROLLED	TOOL STEEL	HI SPEED STEEL	HI CHROME HI CARBON
¼"	16"	9"	5"	2⅜"	1½"
½"	8"	4½"	2½"	1⅛"	¾"
1"	3½"	2¼"	1¼"	½"	⅜"
1½"	2"	1"	⅝"	5/16"	3/16"
3"	1"	½"	5/16"	5/32"	3/32"
6"	½"	¼"	5/32"	5/64"	1/32"

Made by Sawing Machinery Specialists

THE TANNEWITZ WORKS, GRAND RAPIDS, MICH.

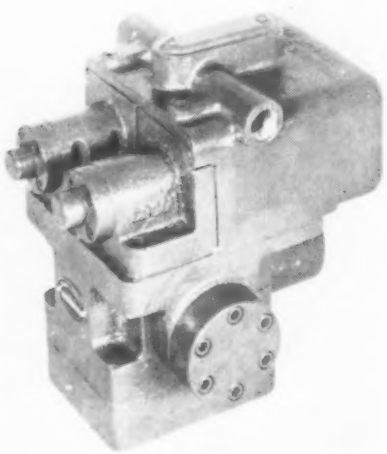
INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 173.

FOUR-WAY VALVE (J49)

Used on machine tools, production ovens, or wherever a spring centered, four-way valve operation is desired, this improved valve, announced by the Hydraulic Hi-Speed Company, 5438 Tire-

(Continued on page 196)



Spring-Centered Four-Way Valve
Closed or open center operation.

The Holder That Compensates for Spindle Misalignment!

Fits Any Machine

Furnished with male or female taper, straight, threaded or special shanks to fit any machine used for tapping or reaming.

Eliminates Over-Size and Bell-Mouthed Holes!

To produce uniform and accurately tapped and reamed holes, when spindles are out of alignment with the work, is child's play if you use a Ziegler Floating Tool Holder —because the Ziegler Holder is specially designed to compensate for faulty spindle alignment. Consequently it not only reduces set-up time but also eliminates spoilage losses due to inaccuracies in set-up.

When you use a Ziegler Holder, you'll be amazed how perfectly it floats. No friction or cramping, even under the severest tool-driving strains. Takes any and all end-thrusts. Prolongs the life of tools. Send for detailed information.

• Write for CATALOG •

W. M. Ziegler Tool Co.
1920 Twelfth St.
Detroit, Mich.

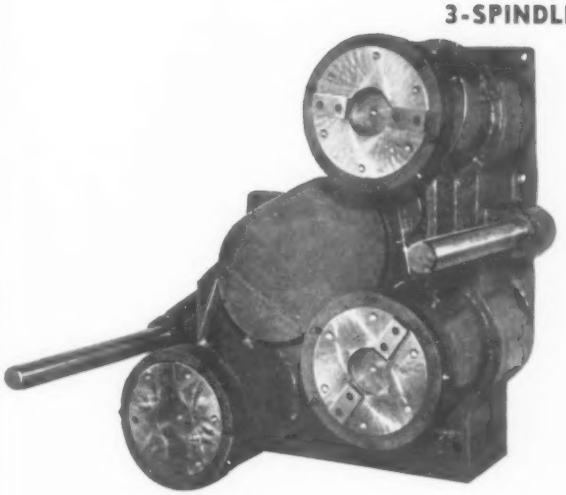
Ziegler ROLLER DRIVE **FLOATING HOLDER** for Taps and Reamers...

Buhr **MULTIPLE SPINDLE DRILL HEADS**

INCREASE YOUR PRODUCTION

TO MEET SCHEDULED DELIVERIES

3-SPINDLE BUHR HORIZONTAL HEAVY DUTY DRILL HEAD



1. Bore, Face and Chamfer.
2. Hollow Mill.
3. Groove Outside Diameter.

Oil pump for positive lubrication.
For finishing one end of large shells.

BUHR MACHINE TOOL CO.
ANN ARBOR MICHIGAN

Specialists in Multiple Spindle Drilling, Boring, Reaming, and Tapping Equipment

man Avenue, Detroit, features either closed or open center operation by a slight mechanical adjustment. It permits a change to a different type of operation without replacing the valve. All that is necessary is the removal or installation of a ⅛ inch socket pipe plug.

Available in 3 models of 10, 18, or 28 G.P.M. capacity with a maximum recommended working pressure of 2,000 p.s.i., this valve is furnished complete with sub-plate and solenoids in a choice of voltage and current characteristics. It contains an integral dumping valve which eliminates the need for a separate pilot pressure system.

Principal uses of this valve are said to include the raising and loading of broach carrier cylinders, the raising and lowering of doors and elevators in quenching operations, and the pushing of stock through heat treating furnaces.

INFORMATION FREE

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Ekstrom-Carlson 5V Vertimil
Has exclusive 5 way feature.

NEW VERTICAL MILLING MACHINE (J50)

This new vertical milling machine is manufactured by Ekstrom-Carlson & Company, Rockford, Illinois. It is called the No. 5V Vertimil and is said to have an exclusive five-way feature. This five-way feature embodies a ram-type head, a swivel head, a sliding spindle, a swivel table, and a four-way power feed mechanism.

Said to allow a wide range of uses, this machine has operating controls which are placed in the front of the machine for the convenience of the operator. The horizontally adjustable ram supports a swivel sliding spindle head and drive.

CUTTING TOOL (J51)

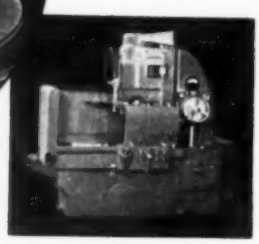
Said to be in answer to a demand for a steel-cutting carbide tool having a lead angle, The McKenna Metals Company, 600 Lloyd Avenue, Latrobe, Pa., announce two new styles of cutting tools, Styles 39 and 40. Said to be particularly economical in shell turning operations because only the edge on the lead angle is sharpened and it is easy to maintain the control position of the nose as the tool is reground, these tools combine the lead angle or side cutting edge angle with a longer than customary tip.

Available in sizes of ⅛ x 5/16 x ⅝ inch to ⅜ x ¾ x 1½ inches, these tools are claimed to be used in shell turning where uniform forgings permit the depth of cut never to exceed the length of the tip having a lead angle. The chip breaker is ground only on the section parallel to this lead angle. These tools may be also used for chamfering operations.

THE END.

"PUT IT ON THE BLANCHARD"

Cast Iron, 30½" x 13" x 1"
Stock per side 1/16"
Limits — must be parallel
Number of Sides 2
2 pieces (4 surfaces) per hr.



BLANCHARD

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- Production
- Adaptability
- Fixture Saving
- Operation Saving
- Material Saving
- ★ Fine Finish
- ★ Flatness
- Close Limits

★ . . . . . *Especially valuable on jobs like the one illustrated.*

Here THE EASIEST WAY IS ALSO THE BEST

This is a difficult job to do any way but on a Blanchard. The piece is of thin section and apt to spring if it is locked in a fixture strongly enough to hold it. The piece is shimmed the first time and a clean-up cut is taken. It is then turned over and a light cut taken on the other side. This operation is repeated four or five times before it is finished.

The BLANCHARD MACHINE COMPANY
64 STATE STREET, CAMBRIDGE, MASS.

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

Why 3 Types of Surface Plates

	SIZES	APP. WEIGHT	BEARING SURFACE	TOLERANCE
A	24 x 36	450	20 - 25	.0001
B	24 x 36	450	12 - 15	.0003
C	24 x 36	450	6 - 8	.001

Because — only in having three different tolerances can we supply you with the economically efficient plate best suited for your needs.

A — MASTER ACCURATE SURFACE PLATES
Note the extreme accuracy and .0001 - .0002 tolerance and 20 - 25 bearings per square inch, constant in all sizes from 14 x 18 to 48 x 96.

B — ACCURATE SURFACE PLATES
Same weight, size and famous 3 point suspension as in type A. The .0003 - .0004 tolerance and 12 - 15 bearings per square inch are constant in all sizes.

C — SURFACE PLATES
Same as A & B except hand scraping is not carried so far. Has .001 - .0015 tolerance and 6 - 8 bearings per square inch. Planer finish plates also available.

LOMBARD GOVERNOR CORPORATION
100 MAIN ST., ASHLAND, MASS., U. S. A.

A Really Fine Tool Room Tool Holder

THE AMERICAN TOOL HOLDER

★ Each holder holds 3 sizes of bits
★ Each bit may be held in 4 positions
★ Grips the tool with a wide grip

MAIL THE COUPON TODAY!

COUPON

Please send complete information on the four standard sizes of American Tool Holders.

NAME ..... TITLE .....
COMPANY .....
STREET .....
CITY ..... STATE .....

T.E.

EDWARD BLAKE COMPANY
634 COMMONWEALTH AVE., NEWTON CENTRE, MASS.

BLAKE TAP GRINDERS — FILTAIRE PORTABLE DUST COLLECTORS — AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS — L & D HIGH SPEED DRILL PRESSES

NEW LITERATURE . . . . . .

T.M. REG. U.S. PAT. OFF.

Of Interest to Production Executives

(569) Surface Grinders

Grand Rapids Surface Grinders. 16 pp. Gallmeyer & Livingston Co., Grand Rapids, Michigan. This booklet completely describes and illustrates the high speed hydraulic feed surface grinders manufactured by this concern. Complete specifications are given for each machine shown and special features of each machine are described and illustrated. Two pages are devoted to this grinder under actual working operations.

(570) Self-Tapping Screws

For Better Fastenings . . . Quicker, Specify Parker-Kalon Quality-Controlled Self-Tapping Screws. 20 pp. The Parker-Kalon Corporation, 190 Varick Street, New York. A small catalog on self-tapping screws, this new booklet describes the quality-control routine, the functions and advantages of each type of screw, stock sizes and head styles, and finishes. It is fully illustrated and shows many applications.

(571) Milling

Hyper-Milling. 10 pp. Firth-Sterling Steel Company, McKeesport, Pa. Describing a radical innovation in the face-milling of steel, this new booklet tells what "Hyper-Milling" is, gives photographs and line drawings of the work, and includes typical performance data charts.

ARMY E NAVY
AWARDED
OCT. 24, 1942
". . . An Army-Navy Production Flag flying above a factory or a mine will bear witness that management and labor there are doing their utmost to help their Army and Navy to win the war . . ." — FRANKLIN D. ROOSEVELT
Schauer Speed Lathes
SCHAUER Speed Lathes are for fast production work—POLISHING, LAPPING, and BURRING of gears, pinions, spark plugs, and similar products. Replace bigger and more expensive lathes used for secondary finishing. For faster production and more economy use SCHAUER Speed Lathes. Send for Catalog No. 420.
"the originators of today's Speed Lathes"
SCHAUER MACHINE COMPANY
2066 Reading Road
Cincinnati, Ohio

INFORMATION FREE

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(572) Lathe Tools

Turret Lathe Tools. 178 pp. The Warner and Swasey Co., Cleveland, Ohio. This new manual describes a line of turret lathe tools claimed to be one of the most complete lines being manufactured today. Tools for both bar and chucking work are shown. Besides photographs and descriptions of each tool, there are diagrams which show typical applications and uses. Information pertaining to machine capacities and dimensions, as well as data on speeds and feeds, is found in the back of the book.

(573) Motors

Senacon Air Motors. 4 pp. Smith-Johnson Corporation, Bendix Bldg., Los Angeles. This new bulletin shows the motor manufactured by this concern applied to pressing, tapping, drilling, broaching, flaring, and latching operations. It also describes the construction of the motor and gives the specifications. Explanation of the use of this motor for providing auxiliary reciprocating fractional horsepower is included in this folder.

(574) Cutting Tools

Stellite 98M2 Metal-Cutting Tools for Machining Steel. 6 pp. Haynes Stellite

(Continued on page 200)

When You See This Tag On An OK Tool

PLEASE BE SURE TO READ IT CAREFULLY

There's a wrong and a right way to use even the simplest cutting tool. In these days, when many operators are still in the learning stage, they need all the help they can possibly be given.

This red-bordered tag, henceforth attached to O K Single Point Metal Cutting Tools, bears instructions for setting up, also helpful hints in metal cutting practice for beginners. If heeded, its message should speed up production and reduce tool wear and breakage.

THE O K TOOL COMPANY • SHELTON CONN.

HELPFUL HINTS for the MACHINE OPERATOR
If the tool attached to this tag is our shankless type (shown above), for quick assembling, insert bit into holder from one side — mate the serrations properly — seat rear angle of bit firmly against tool holder — then lock the clamp down tight onto the bit with the wrench provided.
With our shank type holder (shown at right), locate tool bit squarely on the seat, with shank inserted, and tighten clamp against back of bit. Always use the wrench that came with the holder. Use no "extensions."

(Front)

O K Tools are as sturdy and trouble-proof as good design and materials can make them: but they are PRECISION tools and should be treated as such. To new operators, we offer these general suggestions:
Select tools of proper shape.
Consult your foreman as to correct feed and speed to be used.
Keep tool bits sharp.
When regrinding tool bits, use free-cutting grinding wheel. (We suggest 46 Grade.) Do not force grinding until the bit overheats and has to be dipped into water!
If locking device becomes damaged through accident, report it to your foreman before proceeding.
When through, don't heave the tool onto a crowded bench. Return worn-out tool bits to the tool crib.
THE O K TOOL COMPANY
SHELTON, CONN., U. S. A.
Originators & Sole Manufacturers of the
O.K. SYSTEM
OF INSERTED-BLADE METAL CUTTING TOOLS

(Back)

TRADE O.K. MARK

INSERTED-BLADE METAL CUTTING

TOOL SYSTEM

SPEED UP TOOL DELIVERIES WITH STANDARD DRILL FIXTURES

AN LL TYPE FIXTURE TO LOCATE AND BORE A LONG HOLE IN AN IRREGULAR SHAPED CASTING

STANDARD FIXTURES WITH A FEW ADAPTERS WILL SOLVE THE MAJORITY OF YOUR DRILLING PROBLEMS

ASK FOR CATALOG 941

SWARTZ TOOL PRODUCTS CO., INC.

13330 Foley **Detroit, Michigan**

Represented by

Cleveland—J. W. Mull, Jr.
Indianapolis—J. W. Mull, Jr.
Milwaukee—Geo. M. Wolff, Inc.
Chicago—Ernie Johnson

Canada—Hi-Speed Tools, Ltd., Galt, Ont..
St. Louis—Mill Supply & Mach. Co.
Beverly Hills, Cal.—Criterion Tool Sales
Houston—Engineering Sales Co.

Oneida, N. Y.—W. F. Himmelsbach
Pittsburgh—J. W. Mull, Jr.
Toledo—J. W. Mull, Jr.
Philadelphia, Pa.—Morgan Tool & Equipment Co.

Company, 30 East 42nd Street, New York. This folder lists the sizes and prices of 84 standard square and rectangular tool bits, and of 74 varieties of welded-tip tools, which are all made of 98M2. Recommendations regarding grinding wheels to be used on tools made of this alloy are also included in the folder.

(575) Milling Machines

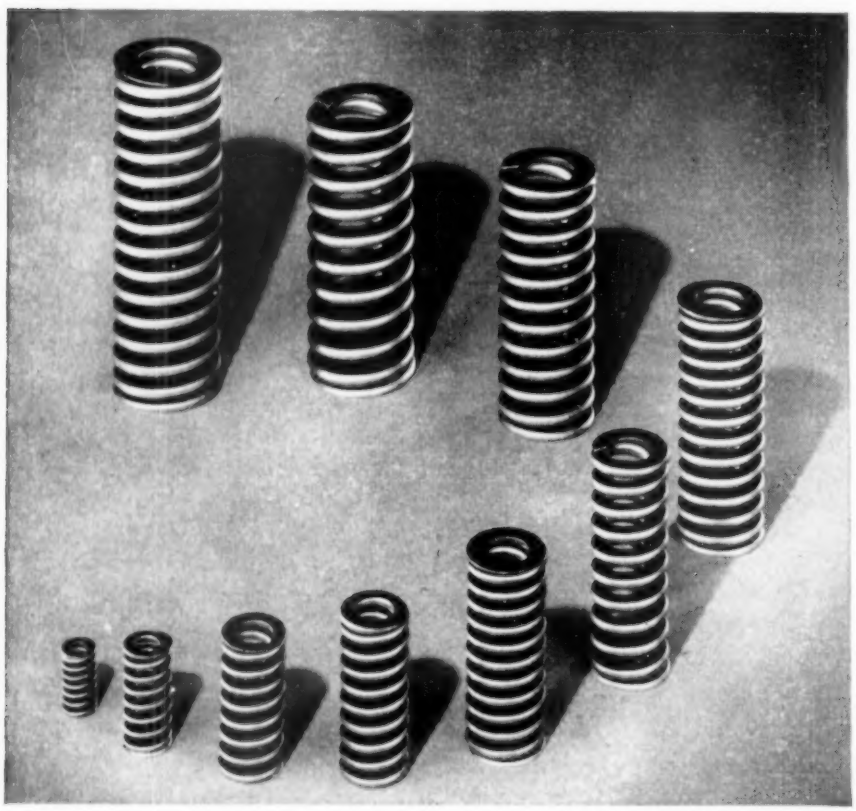
Cincinnati No. 0-8 Plain Automatic Milling Machines. 12 pp. The Cincinnati Milling Machine Co., Cincinnati. Besides giving the specifications and various illustrations of the machine, this catalog lists the highlights of design and benefits. Typical automatic cycles are given and a large photograph of the machine with the various parts pointed out is included.

(576) Reamers

McCrosky Reamer Manual. 16 pp. McCrosky Tool Corporation, Meadville, Pa. This new manual includes such items as the design and construction of the reamers, adjustment instructions, grinding instructions, speeds and feeds, and decimal equivalents. The manual is completely illustrated with photographs and informative line drawings.

(577) Lathes

South Bend No. 2-H Turret Lathes. 8 pp. South Bend Lathe Works, South Bend, Indiana. This new catalog fully describes and illustrates these lathes and includes the attachments and accessories which are available for adapting them to many types of work. Construction features and operation of the lathe are explained. Information on capacities, speeds, feeds, and other specifications is given in tabulated form.



DIE SPRINGS IN STOCK FOR ALL PRESSES • • •

FREE! WRITE FOR YOUR COPIES

New Muehlhausen Die Spring Folder describes and prices 206 sizes of die springs for high speed, regular and heavy duty presses.

Muehlhausen Die Springs are available in three types—Series "S" for high speed presses; Series "M" for regular speed presses; and Series "HD" for heavy duty presses. Over 200 sizes are stocked, ranging from 1 to 15 inches in length and exerting pressures from 80 to 3000 lbs. Each size and type is specially designed to meet the rigorous demands of die work. Muehlhausen's complete stock assures you of immediate delivery.

Muehlhausen Spring Corporation
625 Michigan Ave., Logansport, Ind.

Name_____

Address_____

City_____

MUEHLHAUSEN SPRINGS

EVERY TYPE AND SIZE

INFORMATION FREE

To receive the booklets listed in this section, list the key number found on the heading of the desired literature and your name and address on the postcard coupons—page 173.

(578) Grinder

New Delta . . . Milwaukee Toolmaker Grinder. 4 pp. The Delta Manufacturing Company, 610-N East Vienna Ave., Milwaukee. Many illustrations in this new folder show the various features of this grinder. Also included is a sectional drawing of the spindle design. Complete specifications are given and the description of the operation of this new grinder is included.

(579) Taps

Tap Talk. 8 pp. Greenfield Tap and Die Corporation, Greenfield, Mass. This is the first of a number of educational folders on taps and tapping to be offered by this concern. This folder is an introduction to the subject of taps and screw threads. It includes a quiz on tap parts, threading terms, thread designations and forms, and tap drill sizes. It is illustrated with line drawings.

(580) Lathes

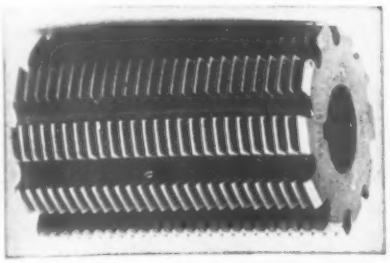
Diehl No. 2 Turret Lathe. 6 pp. The G. M. Diehl Machine Works, 1940 Collins Avenue, Wabash, Indiana. All the important parts of this lathe are described in this new folder which is illustrated with photographs and line drawings. Complete specifications are included.

(581) Presses

L & J Open Back Inclinable Presses. 8 pp. L & J Press Corporation, Elkhart, Indiana. The various models of presses

(Continued on page 202)

MULTIPLE THREAD
MILLING HOBS



—in any thread system, any thread angle, any thread form. Inch or metric scale. Left or right hand threads. Free from distortion. Up to 7" O.D., and 4" thread length for internal or external threading.

TOLERANCES: CUT ON MACHINES ADJUSTABLE FOR TOLERANCES UP TO 1/10,000

All hobs demagnetized relieving chips immediately.

These hobs precision cut by methods used for more than 25 years, eliminating any discrepancy between thread form and form of finished work, thus speeding up production without sacrificing accuracy. Full details upon request to Dept. T.

DELIVERY TIME: FROM 1 WEEK ON

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DEPT. T
100 So. 6th Street, Terre Haute, Ind.

For quick action call plant at Clinton, Indiana, Telephone 85

Federal Taperlock
Plastic
GAGE HANDLES

Made of plastic material, Federal Taperlock Gage Handles are lighter than aluminum or any other metal generally used for gage handles.

★ Light weight makes them more sensitive to touch and reduces fatigue caused by long continuous use. Plastic insulates gages from bodily heat helping safeguard accuracy.

★ Made to conform to dimensions accepted as standard for gages throughout the industry. They are marked for identification with the same lettering stamps used in marking metal handles.

★ The cost is low . . . about half the cost of metal handles. They are available in 6 standard sizes, any quantity and without delay.

FEDERAL TOOL CORPORATION
402 North Leavitt Street, Chicago, Illinois

LARCO
DIAMOND TOOLS

Available in all standard forms or made specially to blueprint specifications . . .

- **DRESSING TOOLS**
- **CLUSTER TOOLS**
- **DIAMOND IMPREGNATED TOOLS**
- **DIAMOND IMPREGNATED WHEELS**
- **DIAMOND POWDER**

Check into "Plus Five", the Patented Dressing Tool that permits accurate, speedy resetting of all six diamond points in your plant.

WRITE FOR CATALOG AND TECHNICAL DATA

DIAMOND CUTTERS FOR 4 GENERATIONS

Industrial Tool Division
LOUIS A. ROSELAAR
551 FIFTH AVE., N. Y. C.
FACTORY: 36 WEST 47th ST., NEW YORK

manufactured by this concern are shown in this catalog. Each is described and the specifications are given. Some of the construction features are illustrated and described. On the back of the folder is a list of the dealers for these presses.

(582) Riveters

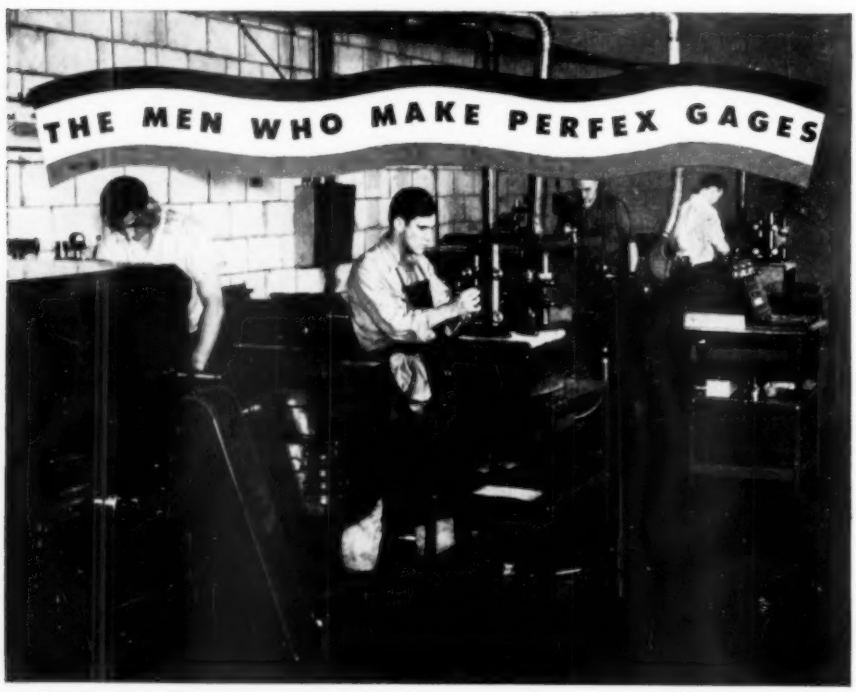
Hanna Squeeze Riveters For Every Purpose. 28 pp. Hanna Engineering Works, 1765 Elston Avenue, Chicago. This catalog endeavors to show the many styles of riveters and their application. It is fully illustrated, each type illustrated is shown at a typical job and is completely described. Other pages are devoted to giving a general outline of individual job requirements and recommendations.

(583) Belt Surfacing

Wet-Dry Belt Surfacing. 24 pp. Porter-Cable Machine Company, Syracuse, New York. Going into detail regarding the relatively new method of wet abrasive belt surfacing, this new booklet contains information on a subject of interest to metal and plastic parts plants. It points out the departments in which belt surfacing saves time, money, and manpower. It tells, by descriptions and illustrations, of the many parts on which operations are done freehand or with inexpensive fixtures.

(584) Conservation

23 Ways to Conserve the Life of Your Multiple V-Belt Drives. 14 pp. Engineering Research Bureau of the Multiple V-Belt Drive Association. This booklet is said to be the Association's contribution to the rubber conservation movement. Its purpose is to educate power users in the proper procedure of selection, installation, and maintenance of their multiple v-belt drives. This booklet contains many drawings.



★ ★ ★ ★ "A product is only as good as the men and machines who make it" that is the reason why we employ the highest type of skilled men who have had years of experience in their respective jobs.

Using modern equipment and working in a plant that was built expressly for the manufacture of gages these men are not only making the finest gages, but they are also working to their fullest capacity to help produce more to help win this war!

With this combination of skilled men and modern equipment PERFEX offers manufacturers gages that are recognized throughout industry as the most accurate made. For a complete description of PERFEX gages write us today for our new folder.

PERFEX GAGES INCLUDE:

★ Thread Plug | Radius Contour | Profile Flush Pin | Adjustable Snap Solid Snap, etc. ★

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3606 GAYLORD DETROIT, MICHIGAN

INFORMATION FREE

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(585) Surface Grinders

Hill Open Side Hydraulic Surface Grinders. 4 pp. The Hill Acme Company, 6400 Breakwater Avenue, Cleveland. Besides containing a description of these vertical and horizontal spindle grinders and mentioning the features and advantages of each type, this new bulletin also lists the general specifications. Illustrations are included.

(586) Lathe Picture

Turret Lathes, Their Operation and Use. 4 pp. Gisholt Machine Company, Madison, Wisconsin. This new folder describes a new 45 minute sound and color motion picture presented by this concern. The folder contains several illustrations from the movie and tells who can order and how to order this film.

(587) Indexing or Holding Fixture

The Zagar Collet Chucking Fixture. 8 pp. Zagar Tool, Inc., 23880 Lakeland Boulevard, Cleveland. This new piece of literature illustrates and describes various types of indexing and holding work this fixture may be used for. Different types of this fixture are shown along with their special parts. Instructions are given for the setting up and operating of the fixture.

(588) Presses

Famco Arbor and Foot Presses. 4 pp.

(Continued on page 204)

BRAEBURN ALLOY STEEL CORPORATION
(Pittsburgh District)
BRAEBURN, PA.

COBALT

18-4-1-5 High Speed Steel

Chemical Analysis

Carbon	Chromium	Vanadium	Tungsten	Cobalt	Molybdenum
.74	4.00	1.00	18.00	5.00	.50

Heating Instructions

FORGING		1800 To 2050°F.
ANNEALING	(Brinell 235-269)	1650°F.
HARDENING		
Preheat		1500 To 1550°F.
High Heat	(Quench in Oil or Air)	2350 To 2390°F.
Draw		1050 To 1100°F.

Hardness Data

Draw	2380°F. Oil
As Quenched	C-65
1050°F.	C-65.5
1100°F.	C-63
1125°F.	C-61
1150°F.	C-60

Applications

Heavy Duty Lathe, Planer and Boring Tools for Cutting Cast Iron and Steel and Heat Treated Alloy Steel Forgings.

WRITE FOR LITERATURE

BRAEBURN ALLOY STEEL CORP. **BRAEBURN, PA.**

SIMPLIFIED **INTERNAL GRINDING**

with the

MAJESTIC

INTERNAL

GRINDER

An exceptionally wide range of internal grinding jobs can be handled on the New Majestic Internal Grinder. Its simplicity of design and ease of operation are features of utmost importance in providing maximum grinding output at low cost.

SPECIFICATIONS

Length of table, 48". Swing over table, 10". Travel of cross slide, 2½". Precision dial graduated to .0001". Precision bearing work head. Speeds—100, 225, 350 r.p.m.

Write for complete details contained in New Bulletin

Majestic Tool & Mfg. Co.

2950 E. Woodbridge Detroit, Mich.

Proven Performance

Tool Engineering

Manufacturing

PRODUCTION PRODUCTS CO. DESIGNING MANUFACTURING PROCESS & METHODS GAUGES TOOLS & DIES SPECIAL MACHINERY ENGINEERS DAYTON 104 EAST 3rd ST. OHIO

- We are working with some of the largest war manufacturers in the U.S.A. — to their complete satisfaction.
- We are ready to handle **ALL** branches of armament production.

Almost 200 Trained Men

What's your problem? We have the men and the facilities! Write . . . Wire or Call.

(Chicago Division . . . 2400 W. Madison St.)

PRODUCTION PRODUCTS CO.

Engineers of Complete Tooling Programs

104 EAST THIRD STREET • DAYTON, OHIO

Famco Machine Company, Racine, Wisconsin. Along with this new folder, covering this concern's products, comes a Famco data sheet which gives accurate dimensions of over 40 stock models, load capacities, and floor space requirements. Both the folder and data sheet are illustrated with line drawings and photographs.

(589) Drills

Hardsteel Drills, Reamers, Tool Bits, and Special Tools. 24 pp. Black Drill Company, 5005 Euclid Avenue, Cleveland. Fully illustrated, this new booklet gives facts and applications on "Hardsteel". Other subjects mentioned include drilling speeds, use of jigs, coolants, countersinking, counterboring, reaming, grinding, and causes of failure.

(590) Cutting Oil

Konag Transparent Cutting Oil. 4 pp. National Graphite Co., Inc., 17 John Street, New York. This folder describes a new cutting oil which is a straight mineral-sulphurized-degummed castor cutting oil. The various grades are listed and described and the prices given.

(591) Carbide Tools

General Tool Catalog. 30 pp. Carboloy Company, Inc., Detroit. Besides covering standard stock cutting tools, this new catalog gives prices and specifications of large number of "Standard Design" tools not carried in stock. This concern's line of standard stock cutting tools has been expanded and thus the catalog includes a larger number of turning, boring, and facing types, round shank boring tools, masonry drills, lathe centers, wheel dressers, center grinders, brinnel balls, scraper blanks, reamer blanks, and tool blanks. Details on tolerances and numerous illustrations of applications for individual tool types are given.

(592) Gear Finishing

Bulletin on a light duty gear finishing machine. Michigan Tool Company, Detroit. Directed to manufacturers of small gears of less than 4 inches in diameter, this new descriptive folder contains information on the design and operating features on this new 861-4B light duty gear finishing machine. Other specifications mentioned include the scope, speed of operation, range of gear sizes that can be handled, cutter sizes, drive motor data, and overall dimensions.

IT'S MADE OUT OF

SPEED TREAT STEEL

A MEDIUM HIGH CARBON OPEN HEARTH PRODUCT

—because . . .

Speed Treat machined faster with better threads

Speed Treat increased production 60%

Speed Treat eliminated warpage during machining

Speed Treat saved $25.00 per ton of steel used

Ductility Plus Machinability (170 SFPM)

In this "all-out" war effort Monarch Steel is co-operating 100%. We're helping to "keep 'em rolling" with Speed Treat Steel.

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THE FITZSIMONS COMPANY

YOUNGSTOWN, OHIO

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HAMMOND • INDIANAPOLIS • CHICAGO

PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

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(593) Milling Machine

Kempsmith Type G Milling Machine. 8 pp. Kempsmith Machine Company, Milwaukee, Wisconsin. This folder not only gives several illustrations of the milling machines, but also shows special features. Complete descriptions are given and many special attachments are shown. The complete specifications are also included.

(594) Barrel Pumps

Trabon Electric-Hydraulic Barrel Pumps. 4 pp. Trabon Engineering Corporation, Cleveland. Complete with sectional views, this new bulletin describes an electric-hydraulic pump for pumping oil, light, medium, or heavy greases directly from the original container. A list of part numbers is also included.

(Continued on page 206)

Single-Point DIAMOND•TOOLS

While octahedron diamonds give entire satisfaction for truing and dressing of most grinding wheels, "Ready-Set" Diamond Tools, containing an elongated stone that may be completely consumed without resetting, may be profitably used on certain operations. Catalog on request.

J. K. SMIT & SONS, INC.
157 Chambers Street, New York

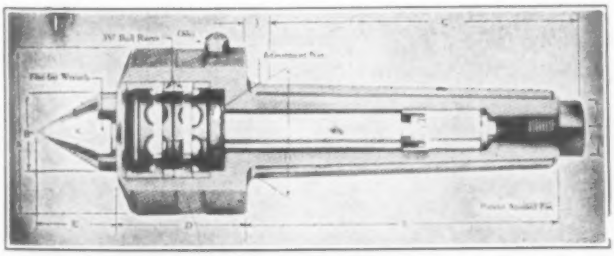
The Improved Nielsen Live Centers

LOAD CAPACITY—200 TO 40,000 LBS. AT 100 RPM.

HAVE ADJUSTMENT TO TAKE UP WEAR AND PRELOAD BEARINGS

STANDARD MORSE TAPER No. 2 TO 6 IN STOCK

Write For Catalogue



NIELSEN, INCORPORATED

LAWTON, MICHIGAN

DIAMOND WHEELS for CARTRIDGE DIES

JKS resinoid-bonded Diamond Wheels for internal grinding of tungsten steel cartridge dies, produce straight holes of mirror-like finish, accurately, speedily and economically. Roughing and finishing wheel diameter 7/16 in.; length 3/8 in.; bore 1/8 in. Special sizes to order. Consult a JKS representative or write for folder.

Prompt deliveries

J. K. SMIT & SONS, INC.
157 Chambers Street, New York

SECOMET Resinoid Bonded Diamond Wheels can do your work more accurately, faster and without appreciable wear. They are most economical for sharpening cemented carbide and multi-bladed tools, such as milling cutters, broaches, etc. Moreover, their sharp, free-cutting action eliminates lapping and the usual semi-finish grinding operation. Catalog on request.

Prompt deliveries

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(595) Broaching

Answers On Broaching and *Broach Sharpening Recommendations.* 24 pp. Colonial Broach Company, Detroit. The first of these two articles contained in this new booklet is based on actual inquiries from broach users. Answers such questions as the best types of broaching machines to use for different jobs, broaching machine speeds, and how to avoid "drift" in broaching cored cast iron. The second article discusses methods of increasing broach life in regard to sharpening. Gives recommendations on storing and handling of broaches and the most suitable sharpening equipment. Drawings are included.

(596) Alloy Steel

A Complete Alloy Casting Service. 2 pp. The Cooper Alloy Foundry Company, 210 Bloy Street, Hillside, New Jersey. This piece of new literature is in the form of a data sheet which shows analyses, physical characteristics, and applications of 19 different stainless steel, monel, and nickel alloys. It also contains a cross reference of designations and type numbers of the Alloy Casting Institute, the American Iron and Steel Institute, and other organizations.

(597) Welding

Arc-Welding Accessories. 32 pp. General Electric Company, Schenectady, New York. Fully illustrated, this new bulletin presents a complete line of welding accessories offered by this concern. Such items as metal and carbon electrode holders, clamps, cable connectors, brushes, chippers, electrode carriers, and fillet-weld gages. A price list accompanies the bulletin.

TOOL BIT DEMONSTRATION

If you are having difficulty getting satisfactory results with Moly tool bits, we may be able to help you.

The TUFF-HARD Moly bits (heat treated by the patented TUFF-HARD process) are recognized as superior all-purpose tools and have definitely established themselves as THE tool bit to use on "tough jobs", especially those involving interrupted cuts and impact applications on steel harder to machine than SAE 1045 annealed.

Right today, they are setting records machining tank turrets, flame-cut armor plate, gun housings, 40 mm. shells, etc., etc., in some of America's largest and best known plants. *In many instances, they replaced tungsten-cobalt high-speed steels!*

To date, insufficient steel supplies have prevented us from taking on new customers. Now, with the purpose of helping speed war production to a greater degree, we are prepared to make the following offer:

Upon receipt of data concerning your most difficult machining operation on which you are using Moly steel (size of bit, material being cut, feed, speed, etc.), we will furnish up to six TUFF-HARD Moly bits for testing purposes together with special testing suggestions and engineering data. These will be supplied on memorandum charge with the bits returnable for full credit if they do not demonstrate unquestionable superiority. Minimum priority rating acceptable—A-1-A.

TUFF-HARD CORPORATION
5961 Caniff Avenue • Detroit, Michigan

TUFF-HARD

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(598) Hollow Mills

Genesee Adjustable Hollow Mills, Facing and Counterboring Tools, and Special Production Tools. 24 pp. Genesee Manufacturing Co., Inc., Rochester, New York. Complete specifications, line drawings and photographs, and descriptions are included in this catalog. Many features of each tool are given and the prices listed.

(599) Honing Machine

Quick Change Speed Self-Oiling Hydraulic Honing Machine. 6 pp. Barnes Drill Company, Rockford, Illinois. This new bulletin illustrates and describes a new size and new design of a large vertical honing machine known as the 4014. Specifications are given and three large pictures show the different styles in which this machine can be supplied.

(600) Speed Reducers

D. O. James Speed Reducers Catalog No. 1000. 400 pp. D. O. James Manufacturing Company, 1130 W. Monroe Street, Chicago. This is a permanent record catalog and contains illustrations and engineering data covering application, examples of use, horsepower ratings, and dimensions of every type of speed reducer. Made with handy section tabs.

(601) Cutter-Grinder

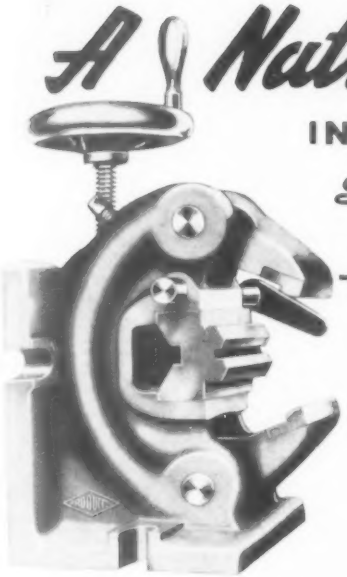
The Hilco Universal Cutter-Grinder with Exclusive Index Dividing Head. 4 pp. Berco Manufacturing Company, Dept. T, 429 West Superior Street, Chicago. This new folder illustrates and describes typical cutter set-ups with dividing head and flat bed.

THE END.

A Natural...

IN ANY SHOP

Self Centering Shaft Vise



This modern machine vise is a "natural" because it just naturally is an asset to any machine shop. For machining slots and keyways in shafts or spindles, ⅜" to 3⅛" diameter—suitable for horizontal or vertical mounting. Setting of vise remains unaltered for all work diameters — insures accurate radial cuts. Hardened V jaw reversible in vise — equal movement of two jaws locates shafts correctly in V jaw.

Base size 8" x 7¼". Approx. wt. 80 lbs.

Write for circular.

PRODUCTO

THE PRODUCTO MACHINE COMPANY

990 HOUSATONIC AVE., BRIDGEPORT, CONN.
3017 MEDBURY DETROIT, MICHIGAN

Torque Wrench

MORE ACCURACY
LIFE
SPEED
3 DIALS

NO FRICTION
ADJUSTMENTS
MOVING PARTS
FRAGILE MECHANISMS

Constructed for exacting laboratory work or continuous production use.

A practical wrench correctly engineered.

PERMANENT ACCURACY.

A capacity and size to fit your needs.

State capacity needed.

PIONEER MANUFACTURERS OF ACCURATE MEASURING WRENCHES

P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

In War, as in Peace...

CERRO ALLOYS

SAVE TIME and CUT COSTS!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

CERROBEND (Melting Temp. 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

CERROSAFE (Melting Temp. 190° F.) Used to accurately proof-cast cavities such as molds, gun chambers, forging dies, etc. and for many similar applications.

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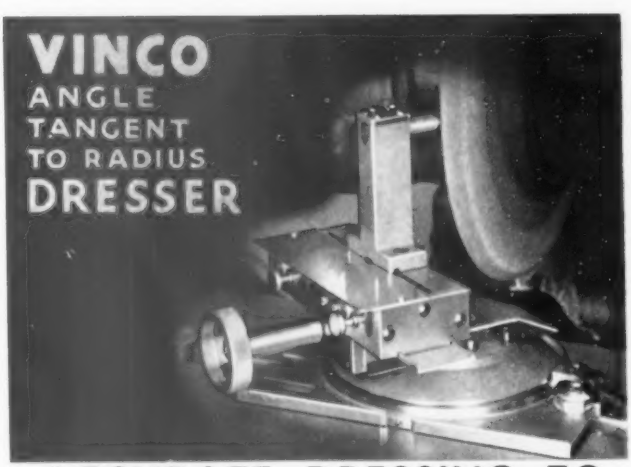
CERRO DE PASCO COPPER CORPORATION

40 WALL STREET - - NEW YORK, N. Y.

VINCO ANGLE TANGENT TO RADIUS DRESSER



ACCURATE DRESSING TO WITHIN .0001"

Employing the fastest, most accurate method of dressing abrasive wheels, the VINCO DRESSER meets every forming requirement in dressing radii, angles and angles tangent to radii. Every operation can be performed from the same axis without removing the diamond.

It provides the closest possible accuracy in all dressing operations, reduces time and expense, and gives trouble-free service under all production conditions. Adaptable for use on external, internal, cutter and surface grinders.

VINCO Corporation
9115 SCHAEFER HIGHWAY,
DETROIT, MICH., U.S.A.

HANDY ANDY says:

T.M. REG. U.S. PAT. OFF.

FIRST OFF, I'll dispose of various loose ends from my recent "invasion of the East", as Ray Morris put it. Back in Detroit, relayed Warren Ames' regards to Ed Goodwin, Detroit, B. C. Ames Company representative.

Also, at behest of the Peterson clan in Providence, called up Jack McLaren of the McLaren Screw Products Company. In case you don't know it, Jack had histrionic leanings in his younger days, (so did I, for that matter) with special emphasis on the light fantastic. Tried to teach me the buck and wing, he did, but my feet never did get educated, that way. They interfered, so to say. Besides, I couldn't sing. Anyway, Jack's quite the industrialist by now, and sends his best wishes to his old pals in Li'l Rhody.

▲ ▲ ▲

SOMEHOW, my plans for Providence and vicinity went all aglee, as the Scotch say. Wanted to call on Bill Ormondroyd, up in Woonsocket, and Ed Berry of Little Rhody chapter, but what's left of my gall bladder (after some fancy quarrying a few years back) acted up all of a sudden and I had to hole up until the riot subsided. Guess I walked too much, trying to cover the ground of a former lifetime in a few days.

Ed Berry, by the way, came through with some very timely suggestions in a letter to George Nye of *Circular Tool*, Providence, of which I received a copy. It covered so many points of general interest to the Society that, in my opinion, a copy should go to each Chapter. Incidentally, I came across an old acquaintance in the letter — Alexander Keema, once tool room foreman at Taft-Peirce. Bright young chap, when I first met him, and it doesn't look as if his lustre has dimmed any. He started the Liberty Tool back in '16 or so and kept it going and growing.

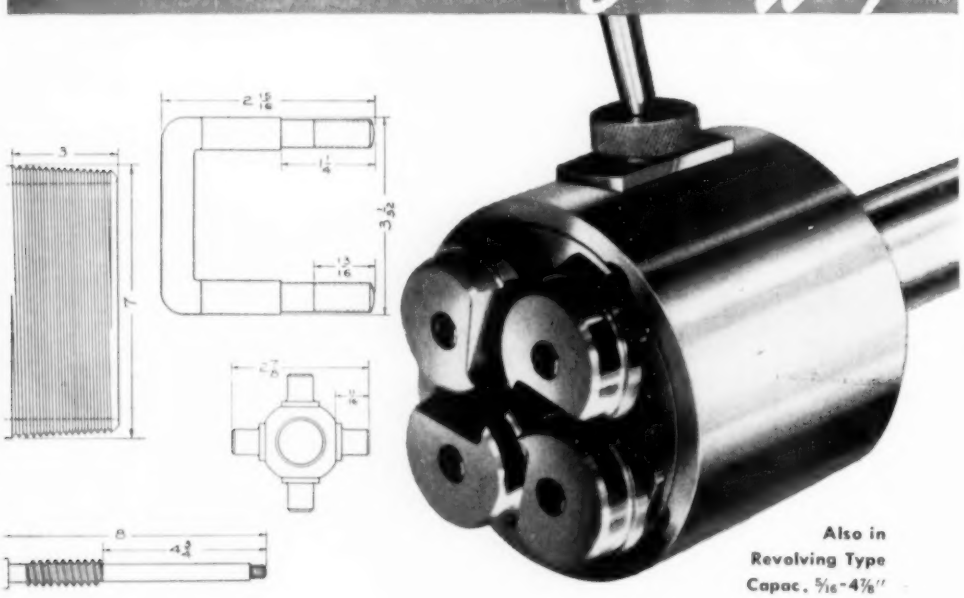
▲ ▲ ▲

I PROVED ONE THING by going East — that there's a wealth of technical material among the various Chapters if a guy could only pry it loose and if the boys would take time to write it up. The Boston boys have responded nobly, and I'm looking for material from Syracuse.

Thanks to Harvey Jacobson for ideas for THE CRIB, and to Ted von Rosenwinge for a fine story in pictures. I got his name mixed up, and was looking all over Springfield for a guy named anything from Rosencranz to Rosenquist, thinking he'd be at the Convention. But you know, I put down so many names, on odds and ends of paper, that I'm still unscrambling 'em, a job made no easier by my Spencerian (?) chirography. Well, hand-

(Continued on page 210)

HOLLOW MILLING
RODUCTION-LINE JOBS" THE *Short Way*



Also in Revolving Type Capac. 5/16-4⅞"

ıkers of these and hundreds of other hollow milled parts have switched m single point tools to Namco Hollow Milling Multiple Cutter Heads because —

4 chips at each pass give them 300% gain in cutting time alone.

On jobs having more than one diameter, shoulders and radii, they eliminate fussing with separate single point adjustments, for one simple adjustment in a Namco head brings all the cutters into final position.

With duplicate sets of cutters reground and checked in the tool room, ready —there is no fussing with individual tools, no scrap loss in getting started —production is practically continuous.

You can hollow mill or cut threads with the same Namco head simply by changing cutters and blocks—"Double Duty" tools.

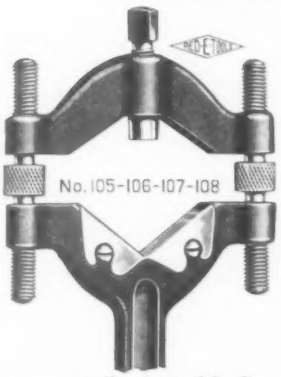
Ask us to show you how the SHORT WAY will save time and cost on your hollow milling jobs.

NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND, OHIO

E GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND S • SCREW MACHINE PRODUCTS • THE CHRONOLOG • LIMIT SWITCHES • SOLENOIDS • POSITIVE CENTRIFUGE • CONTRACT MANUFACTURING

Adjustable for Different Diameters

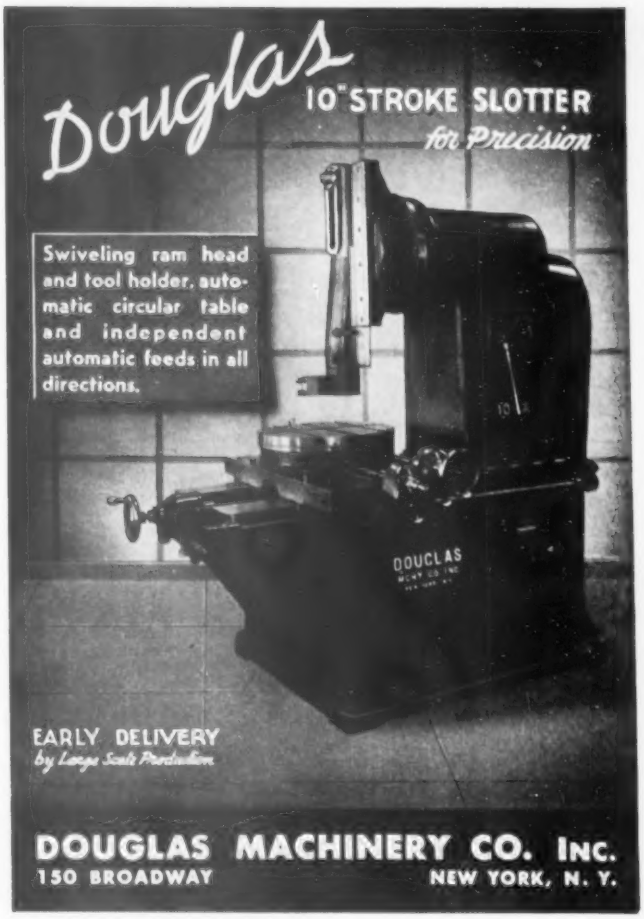


This straight tale grinder dog

is especially desirable for use on cylindrical grinders of various makes, comes in four sizes and thus will accommodate any diameter from 1/4 inch to 6 inches. There is but one screw to be operated and work can be handled as quickly as with any single screw dog. They have brass faces and brass-tipped set screws.

WRITE FOR CATALOG E-42

THE READY TOOL COMPANY
585 IRANISTAN AVE.
BRIDGEPORT CONN.


Douglas
10" STROKE SLOTTER
for Precision
Swiveling ram head and tool holder, automatic circular table and independent automatic feeds in all directions.
DOUGLAS
EARLY DELIVERY
by Large Scale Production

DOUGLAS MACHINERY CO. INC.
150 BROADWAY NEW YORK, N. Y.

For your specially designed cutting tools, A.C.E. offers a highly specialized experience to insure exact reproduction and rigid inspection that minimizes rejects. Many of the nation's leading defense plants use A.C.E. special cutting tools regularly. Integrity of product is our watchword. Send us your prints for estimate.

NOTE:—we do not make tools for stock.

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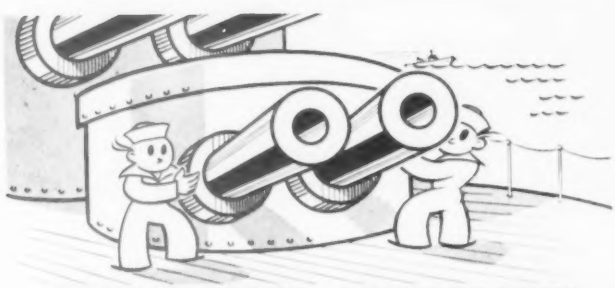
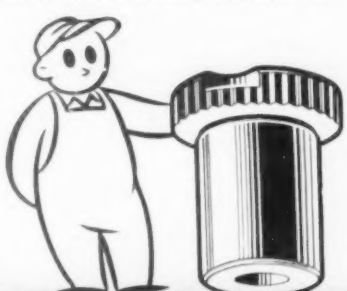
AMERICAN CUTTER
AND ENGINEERING CORP., WARREN, MICH.
SPECIALIZING IN HIGH SPEED CUTTING TOOLS TO YOUR PRINTS



THEY'RE NOT BIG GUNS — BUT THEY'RE MIGHTY IMPORTANT TO UNCLE SAM'S ARMS PROGRAM

In plants from Maine to California Universal Drill Bushings are busy doing their bit toward stepping up the speed and efficiency of America's Arms production. Because of their straight and round superfinished bores, Universal Bushings save tools and assure accuracy. Write for further facts.



UNIVERSAL ENGINEERING CO.
FRANKENMUTH · MICHIGAN

writing, then! — I'm still mixing broad and flat A's since visiting Boston.

And speaking about ideas, somewhere in the Kimball lobby (I think) one of the boys was telling about a simple Tee slot cutter, with a radius on the bottom and a clearance on the shank end. If the guy will write me, giving the gist of the conversation and who else was in the group, I'll pass the idea along for THE CRIB. On acceptance, Roy Bramson will send him 5 bucks. Don't all speak at once, now, 'cause I'm just off the beam a bit and will get all oriented by a pat reminder.

▲ ▲ ▲

HEARD FROM DWIGHT EARLY (who *Tool Engineers* out Chicago way) a while back, but as usual, never got around to answering. Anyway, I take short cuts here in the Column, really better than one of my longhand letters which only gives the recipient something to worry about. Dwight, by the way, is writing a book — "*When Columbus discovered Chicago*" which might go over even if Chris did do a Wrong Way Corrigan.

What I started to say is that Dwight is to look up a couple of Carlson brothers for me — Hjalmar and Helge — who were side-kicks of mine when we were boys on t'other side. Wonderful marksmen, those boys, and the stories I could tell! Anyway, I'd like to meet 'em again, and anyone connecting me will be well rewarded, if not in filthy lucre then in paeans of praise.

▲ ▲ ▲

SPEAKING OF THE TOOL ENGINEER reminds me that I haven't introduced the latest addition to the Bramson Publishing Staff — likeable and hard-working Ralph Davis. Ralph's pants run to paint stains and India ink spots, as befits a man with the artistic temperament. You see, he's THE TOOL ENGINEER art man, and doing right smart as attested by the enhanced appearance of the journal.

Oh yes, every day in every way we're getting better and better, as Doc Coué said. And we're really just starting.

▲ ▲ ▲

LOOKS AS IF THE HOUNDS have stopped baying for the duration, Gardner Young and yrs. truly being the only members of the Pack at Springfield. There was a yelp or two from the Scotties, although I couldn't quite register the breed by the sample mascot. Tail was too long.

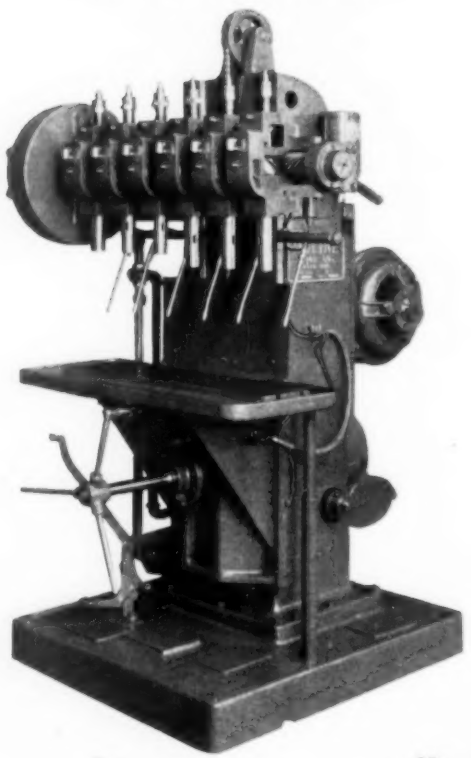
Oh well, you can have your Scotch, but this coffee rationing—man, that's awful! Wonder how long it'd take a guy to walk to Brazil? At that, you can't stump me, having already had plenty experience substituting war material. I'm just going to roast some barley and rye, mix it with dried and roasted chicory root, grind it all up and hope for the best. And you can make tea (of a sort) from dried rose leaves and some caraway seed. Well, that's that!

▲ ▲ ▲

NOW FOR SOME RANDOM COMMENTS. This bird Ojerholm, from Worcester, now. If you see him, ask him did he live on Perry St., later changed to Falmuth? And tell him that the wife's maiden name was Signe Johnson, and if he's the guy who pulled her hair she sends best regards and the same to the

(Continued on page 212)

Moline Straight Line Drillers



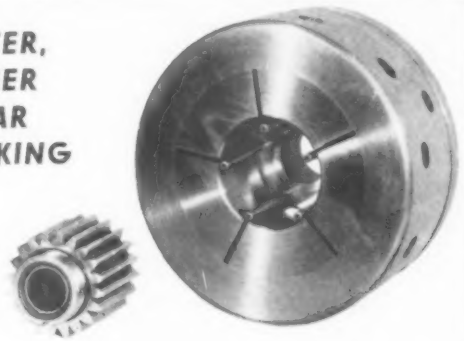
No. 6 Driller

Have the advantage of being easy to adjust for new center distances plus the ability to produce quality work at a rapid rate. These machines are built to stand up under the strain of long hours and hard work.

MOLINE TOOL COMPANY

Moline, Illinois **"Holehog"** **Established 1901**

FASTER, EASIER GEAR CHUCKING



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SPEED-CHUCK

The Cotta SPEED-CHUCK is specially designed to hold a gear accurately, and concentric with the pitch line, for hub, hole, or face grinding or other comparable operations. The gear is simply set into the chuck and given a slight turn to the right, whereupon it is gripped firmly by a set of hardened pitch-line pins engaging the gear teeth. These pins bear against a set of hardened and ground cams which are placed to tighten against the normal direction of rotation. The gear is released by a slight turn to the left. Cotta SPEED-CHUCKS can be made for spur, helical, or cluster gears of any size. Each SPEED-CHUCK is individually designed for the gear it will handle. For further information, write . . .

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NO SPRAY NO SPLASH WHEEL GUARDS

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CARBIDE TOOL GRINDERS

MODELS 4, 6, 10, 14, 20

"You're Dry when you grind Wet"

Guards are concealed, easily accessible, maximum light and operation freedom around the wheels.

WRITE FOR BULLETIN 201

Other Hammond Grinders: "4" Combination Chipbreaker and Grinder; 6, 10A, and 20S Carbide Tool Grinders.

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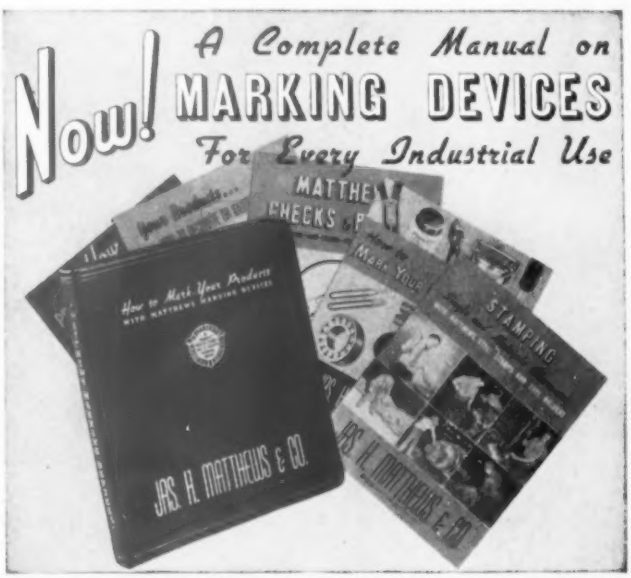

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old gang in Quinsigamund. Oh, I tell you, this Column is handy — you get around everywhere in it.

▲ ▲ ▲

YOU KNOW, I've subscribed rather heavily to the old adage that honesty is the best policy, although there have been times when my faith has wavered in the balance. And, (as I'll connect later) I've made it a policy to write only well of my fellows, except as the politicians may come in for a flick of the lash once in a while. But then, they have it coming by and large; no telling what they'd get away with if we didn't jack 'em up once in a while. But that's an aside; I was going to tell you a story.

On various occasions, during the years of fond illusions, I worked under pettifoggers who not only stole ideas, but who profited thereby as well. One department foreman, in particular, brazenly arrogated one of my ideas right in front of the Old Man, got a promotion. Another patented ideas that I'd worked on for months, at home, and enriched himself by some $1800. Yet another made me the goat for one of his own blunders; he too, profited, while I resigned my job in bitterness.

▲ ▲ ▲

MANY A YOUNGSTER has been turned into a malcontent by such incidents, and I'll admit that I did not emerge unscathed from the heat of bitterness. But, I was wise enough to blame it on the individual, not on management — "the system" — as the pinks would have it — and stuck to my course.

You see, I also had the example of men of such sterling character that pettiness was beneath them, and fortunately, these made the greater impress. Well, the years rolled by, and lately I've had news of both the good and the bad, to so differentiate them. The decent and the honest have grown in the esteem of their fellow men, and, if they haven't always grown rich in worldly goods, they have acquired compensating spiritual values. They are *secure*.

Of the others? Well, the last I heard the erstwhile department foreman was a bum, panhandling his bread, the second died in disgrace and the third is in exile, also disgraced and estranged from his family. Each had zoomed to temporary opulence, and each plummeted to the depths. I hold no rancor, somehow pity them — and hold to a course. The goal may be slower of attainment, but at least one can moor to bedrock, not to shifting sand.

Handily yours,

STATE

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PROMPT DELIVERIES

FOR WAR WORK ON THIS NEW HIGH SPEED PRODUCTION TOOL

Six sizes will accommodate all diameters 1 1/16" to 5½" H.H.S. or tipped cutters. *Special models engineered to your specifications.*

WRITE OR WIRE FOR DETAILS

STATE MANUFACTURING & CONSTRUCTION CO.
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A. S. T. E. DOINGS

(Continued from page 166)

Financial Editor, as industrial news usually appears in the Financial section. Pictures of Chapter meetings should be inserted, if possible. Next to newspapers, the best medium of publicity is the State industrial magazine. Newspapers should also be furnished with a mimeographed Chapter roster.

Area conferences on public relation efforts were proposed, with the Directors in each Area conducting such

(Continued on page 214)

Columbia TOOL STEEL

MEETING DEMANDS—

Maximum production of the implements of war depends on users of tool steels.

Columbia is all-out for its users with all the facilities, skill and ingenuity at its command.

Ask for help if you need it.

It pays to use Good Tool Steel.

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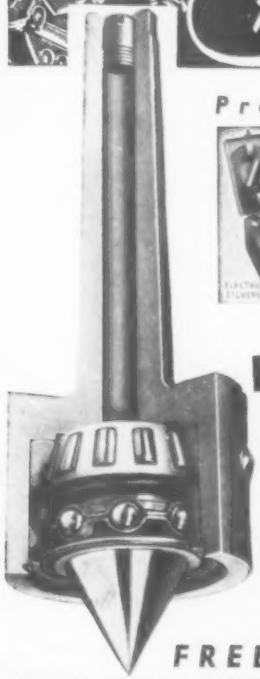
Production Speeders



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Turn Heavier Loads Faster

They rotate WITH the work—and thus permit heavier loads—faster speeds—deeper cuts! Radial load carried by high precision ball bearing, and thrust load absorbed by a taper roller bearing.

TRIPLE DUTY 3 interchangeable center pieces for all centered and uncentered work. Save set-up time.

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The MOREY 2G

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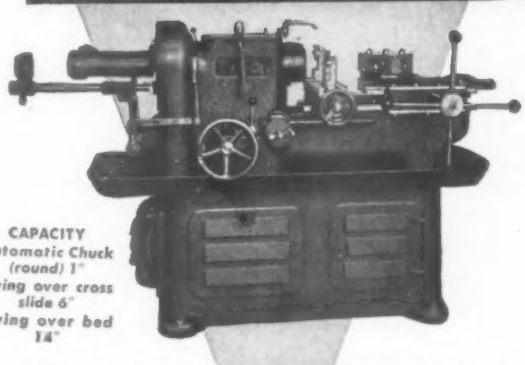
TURRET LATHE

Timken Bearing

Self-Locking Turret and Infinite Spindle Speeds



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Automatic Chuck (round) 1"

Swing over cross slide 6"

Swing over bed 14"

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Files, chisels, hammers and grooves soft metal; EVEN HARD STEEL EASILY MARKED USING TUNGSTEN NEEDLE. Cuts cloth patterns, rubber gaskets, engraves designs on glass, puts identifying numbers on production parts . . . names on identification disks, etc., etc. Tool uses vibration principle, 120 vertical strokes per sec. 60 cycles operating from any 110 V. AC outlet.

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The Wells Series 80, above, is the latest model of the popular Wells No. 8. It has all the advantages that Wells have built into their products through years of leadership in band saw manufacture. It is a rugged, versatile unit capable of cutting up to 8" rounds or 8" x 16" rectangles. You will find it one of the handiest tools in a plant. You can get one quickly too! Phone your distributor or write us.

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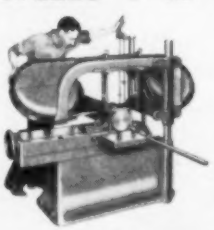

Capacity is 13" rounds; 13" x 16" rectangles.

WELLS MANUFACTURING CORPORATION

Wells METAL CUTTING BAND SAWS

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a meeting over a weekend, at which time suggestions would be developed for submitting at Board meetings.

A Pioneer's Honor Roll of ASTE oldtimers of recognized ability was proposed. Mr. Potter requested that this proposal be put in writing.

Delivery has been made on the "Chairman" and "Past Chairman" lapel pins. One Chairman's pin is to be given to each Chapter (to rotate), and the Past Chairmen's will be sold to the Chapters.

He announced that a Canadian office will be opened at Windsor, Ontario, to handle all funds, applications, and other Canadian ASTE business, this office to be visited at least once a week by someone from National Headquarters at Detroit.

Mr. Potter also explained the giant ASTE organization chart made for the Convention. Four hundred and seventy-seven members are represented on this chart which will be reduced through photographic reproduction for publication in THE TOOL ENGINEER.

Attention was also called to the ASTE electric map, prepared under the direction of Kenneth F. Thomas, New England Area Publicity Vice-Chairman, which had its preview at the WAR PRODUCTION CONFERENCE. This map has flashing, colored lights illuminating the various Regions and indicating other pertinent information about ASTE. It is planned to use it as a traveling exhibit to be placed in vacant store windows in ASTE cities.

The problem of acquainting traveling ASTE'rs with local Chapter meeting places and dates was discussed. One suggestion was that THE TOOL ENGINEER list this information as soon as it can be procured from the Chapters; also that the Chapters cooperate in getting meeting notices in to the National Office in time for publication in the journal. Suggested that ASTE be listed in each telephone book, using the phone number of the Secretary for such listing.

It was requested that National Meeting registration be arranged by Chapters for the convenience of those attending.

Those present were unanimous in favoring the incorporation of similar Clinics in all future National meetings.

THE END.

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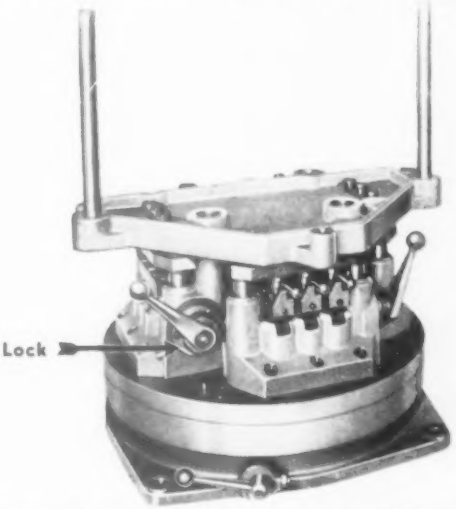
AUTOMATIC FIXTURE LOCKS



Why leading Tool Engineers specify SIEWEK automatic fixture locks:

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2. Are a positive lock.
3. No back lash.
4. Will not release under chatter.
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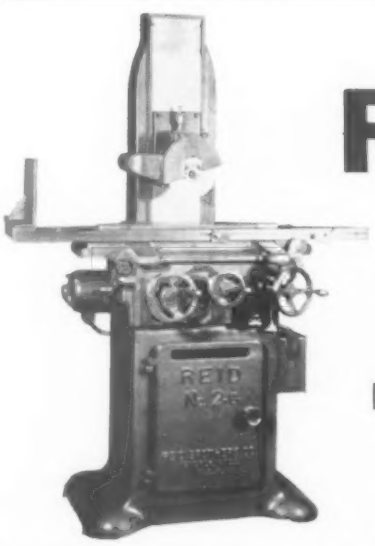
All Electric Automatic and Hand Feed Surface Grinder



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THE Reid All Electric Surface Grinder is equipped with a motorized spindle, thereby eliminating all belts, pulleys, and counterweights. Table and cross slide are equipped with oil rollers, insuring greater life and proper lubrication. Table is operated with a silent chain instead of rack and pinion gears. Grinding capacity 6 x 18 x 11. Additional height if required on all standard machines. Send to Dept. O for descriptive literature.

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A Reid Distributor In Every Principal City

The ENTRANCE to PRECISION MANUFACTURE

SPECIAL SERVICES	STANDARDIZED STOCK ITEMS
Precision Grinding *(Internal—External-Centerless)*	Drill Jig Bushings
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Flat Lapping	Liner Pins and Bushings
Cylindrical Lapping	Screw Machine Reamers
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Hardened and Ground Precision Parts	Lightwave Measuring Equipment

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Less Fatigue...
faster inspection with the NEW MICRO-CHEK

Thread-gaging anvils for pitch diameter and thread leads are available.

LESS fatigue, faster inspections, are speeding up the gaging of millions of precision parts in more than 800 war plants which are now using the new Trico MICRO-CHEK.

Many big industries have installed scores of these new comparator gages as a result of testing out a trial instrument. They found these advantages:

1. Greater speed with no sacrifice of accuracy; **2.** Faster reading, less eye-strain and fatigue on operators; **3.** Original accuracy continuously retained by re-setting with original master parts; **4.** Inexperienced workers quickly become accurate inspectors; **5.** Special fixtures or anvils for holding parts to be inspected require less accuracy and cost less to make.

Multiplies dimensions by 200.

A BRAILLE TYPE...
readable by finger touch... to open inspection jobs for the blind.

TRICO **MICRO-CHEK**
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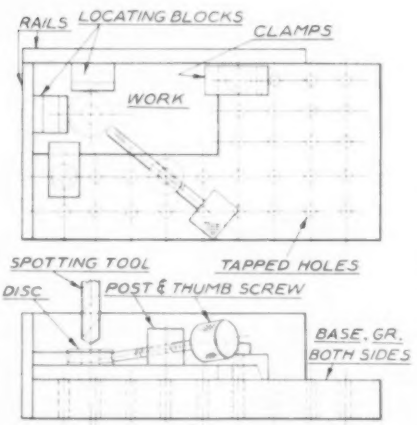
THE CRIB

IDEAS · KINKS
SHORT CUTS

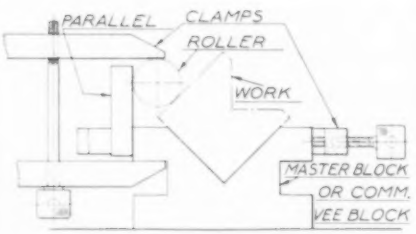
To Locate for Boring

THIS METHOD OF LOCATION is extremely useful when a jig borer is not available. The base, rails and disc are hardened and ground. The spotting tool is a flat drill.



The disc can be moved in relation to the work by building up with blocks between the rail and the disc. Put plenty of tapped holes in the base for strap screws and for the binder post.

When V-Block Clamps Interfere



IN GRINDING PARTS in commercial V-blocks, where regularly furnished clamps interfere, the set-up shown provides both wheel clearance and accuracy.

(Continued on page 218)

SAFETY
(Reg. Trade Mark)
WEDGE GRIP RADIUS HOLDER

For marking around circumference of shell forgings, bars, tubes, and other round pieces.
Adjustable for stamping on different size radii.
Safety Steel construction eliminates spalling and mushrooming.

Write for circular

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Possession of the utmost limit of war bonds is more vital to you and your business than all other forms of insurance combined: Give them for Christmas.

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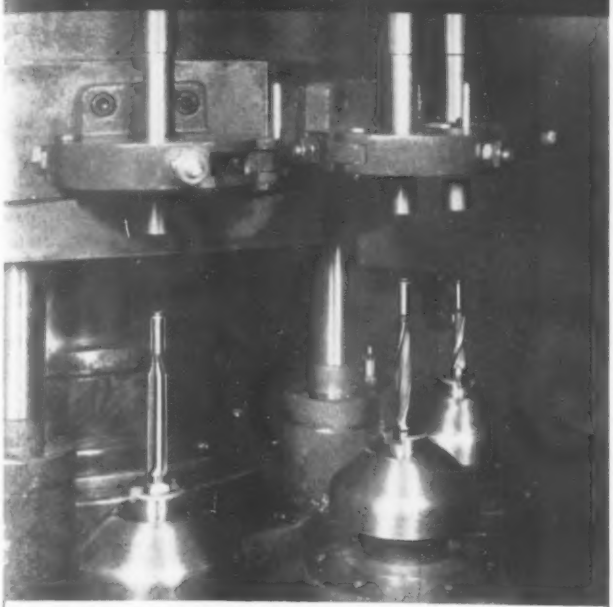
10 STATIONS - 10 PUTNAM HI-SPEED TOOLS
FOR THIS CHAMBERING OPERATION



Illustrated is part of an automatic chambering machine, one of several manufactured by H. R. Krueger and Company. The machine forms and finishes the cartridge chamber at the rear of a machine gun barrel in ten operations. Extreme accuracy on every barrel is of great importance to assure uninterrupted performance in the field. Putnam Hi-Speed reamers and drills are standard throughout on these machines.

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2987 Charlevoix Avenue • Detroit, Michigan

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The inside story of Tuthill dependability can be summed up in two words: PRECISION MANUFACTURE. Hundreds of thousands of Tuthill Pumps in service prove that it takes skill, experience and production efficiency to create equipment so outstanding and dependable in performance.

Today, more than ever, you need these precision ingredients. That's why it will pay you to specify Tuthill positive displacement, internal-gear rotary pumps.

COOLANT PUMPS . . .
. . . Capacities up to 50 g.p.m.
LUBRICATING PUMPS . . .
. . . Capacities up to 50 g.p.m.
HYDRAULIC PUMPS . . .
. . . Pressures to 400 p.s.i.
LIQUID TRANSFER PUMPS . . .
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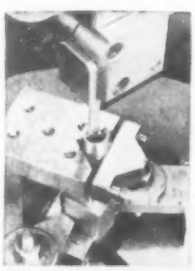
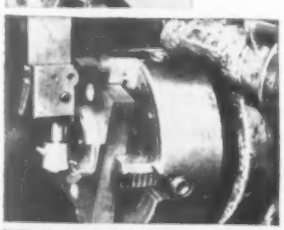
FUEL OIL PUMPS . . .
. . . Capacities to 50 g.p.m.

Write for Tuthill Catalog

Tuthill PUMP COMPANY
939 EAST 95TH STREET • Chicago



4 of the many ways SLOTMASTER can be used to save TOOLS & SETUPS



Left: Set-up for cutting a spline.
Below: Set-up for cutting an internal gear.

SLOTMASTER can be used on any round or flat-on-round overarm milling machine and will do precision work that normally requires a multi-thousand dollar machine. (All working parts are of tool steel heat treated and ground to close tolerances). It takes but little time to change over from one head to the other . . . the stroke of the ram is adjustable from 0 to 4" . . . the speeds range from 50 to 250 S.P.M. The tool holder is of the clapper box type and can be turned in any position. SLOTMASTER comes complete with pull-motor, mounting bracket, etc. . . . Send for a 4 page catalog—give specifications of the milling machines you wish to equip.

Immediate deliveries on high priorities.

EXPERIMENTAL TOOL & DIE CO.
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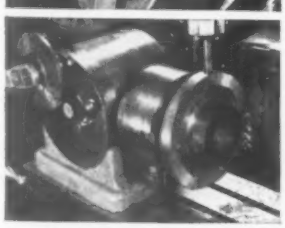
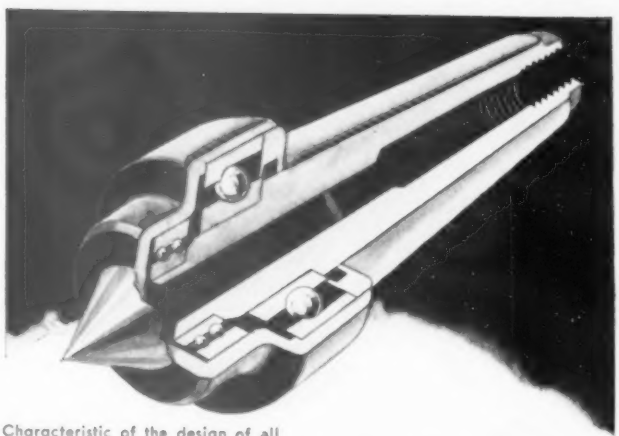
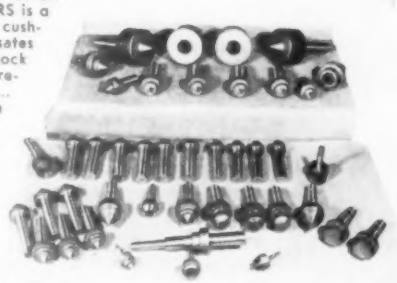


Below: Conventional set-up on a round overarm milling machine thumbnail shows the set-up for cutting a feed cam.



Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat, shock and excessive thrust loads—reducing wear to a minimum . . . A Properly engineered Live Center is one of the fundamentals of setting up a job and requires a specialists experience . . . standard shanks with Morse taper carried in stock. We will see that your job is set up with the right Live Center — Prompt deliveries on high priorities.



STURDIMATIC
TOOL COMPANY
5218 THIRD AVE. DETROIT, MICH.

YOU'VE GOT A JOB TO DO *FAST!*

ARO

PNEUMATIC TOOLS CAN HELP YOU

★ This War is no push-over! *Every* ounce of human energy... *every* pound of plant production must be exerted... NOW!

Our job is building Pneumatic Tools for small tool work, TO HELP TURN OUT MORE PRODUCTION AT GREATER SPEED WITH LESS OPERATOR FATIGUE.

The short grinder illustrated not only can be used for grinding but is excellent for rotary file work on aluminum, magnesium and non-ferrous metals. It is light in weight for one hand operation, yet it has ample power for round-the-clock production. Many large plants have standardized on the Aro 22BGS Short Grinder for castings finish.

ARO Rotary Pneumatic Tools are powerful...ruggedly constructed...simple in design...lightweight...stall-proof. They are ideal for drilling, grinding, screw driving, nut setting, filing, sanding, etc.

Send for complete catalog or see your Jobber.

THE ARO EQUIPMENT CORPORATION • BRYAN, OHIO

Pneumatic Tools . . . Lubricating Equipment . . . Aircraft Products

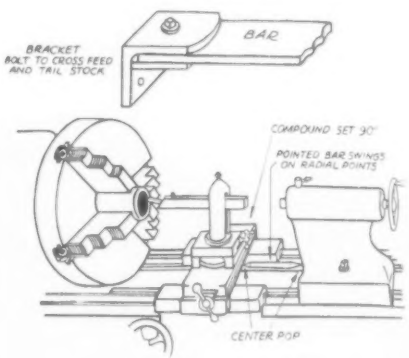
THE CRIB

(Continued from page 216)

Cutting a Spherical Sweep in a Lathe

Editor's Note: Below is a shop help that was sent in by a young tool engineer who has opened his own second front. Corporal Ira W. Franklin is fighting on two fronts. Doing full time in his job with the Army, he still finds a few minutes to turn his mind to the problems of the shop — the production front at home. The drawing was made from a rough fountain pen sketch which Corporal Franklin sent with a letter to **The Tool Engineer.** The idea is quoted from his letter.

"HERE IS A METHOD for cutting a perfect spherical sweep in a lathe, inside and outside. It is a good method for short runs or odd jobs.



"Place a center punch mark in crossfeed of lathe and another good one in the tail stock, both at equal depth of ways. Get a bar, same length as the radius required, grind both ends to a point, lock tail stock and saddle with bar in place in center pop and set compound 90 degrees for feed into work. Care must be taken to get the center pop in line with axis of compound on crossfeed. A small drilled hole in work set to distance of depth of chordal arc helps.

"Of course for more accurate work, and production, a spherical bar could be made flat and two members bolted into respective parts — that is to crossfeed and tail stock. Reverse this process for male spherical sweep.

"Another good kink that a lot may know about — and a lot may not — is facing work in the lathe to close tolerance and limits. Set compound over to 30 degrees and then according to trigonometry functions — twice the depth on crossfeed will be once the depth of cut taken. This works — or it has for me. Looking to more ideas in THE TOOL ENGINEER."

(Continued on page 220)

LYON STORAGE UNITS

ENGINEERED IN *Wood* FOR THE DURATION

● Here is the only complete line of wood storage equipment on the market today . . . designed by an organization that has 43 years experience in producing steel storage equipment. The name "Lyon" on these products is your guarantee of efficient design and practical construction.

LYON METAL PRODUCTS, INCORPORATED
7912 Madison Avenue, Aurora, Illinois

Send Catalog of Lyon Storage Units Engineered in Wood.

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WITH BROWN & SHARPE PRECISION TOOLS

— — Designed and built for *dependable service* so important today on round-the-clock production

We are proud to be honored with the Navy "E", awarded for outstanding accomplishment in Defense production.
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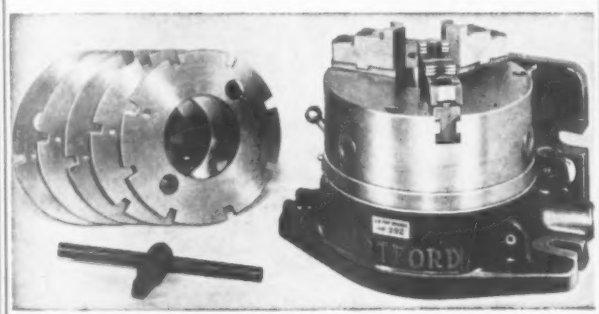
BROWN & SHARPE TOOLS



Rapid Indexing with-

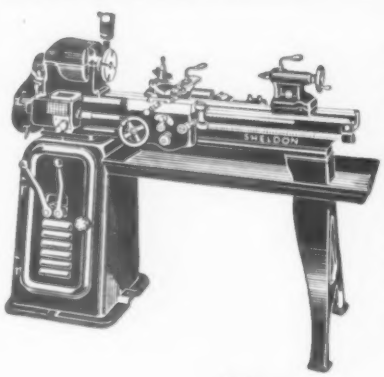
THE HARTFORD SUPER-SPACER

Heavy cuts do not lessen the accuracy of the indexing done by this Super-Spacer, pictured above with standard equipment of mask plates, reversible jaw, self-centering chuck, and sliding handle chuck wrench. Proven to be a machine tool of great value for the rigid control of accurate machining, the Super-Spacer has a powerful clamp that relieves the index plate and plunger of all strain by binding the turret solidly to the base. With its attachments and fixtures the Super-Spacer is adaptable to milling, drilling, grinding, jig boring, and slotting operations.

WRITE FOR COMPLETE INFORMATION

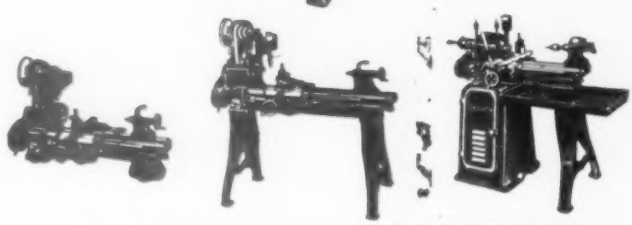
THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD, CONN.

SHELDON Back Geared Screw Cutting PRECISION LATHES



For the Tool Room

The finest 10", 11" and 12" lathes ever built in the moderate price field. Large special analysis steel spindles GROUND ALL OVER, with extra collet capacity. Hand-scraped Bronze, Ultra-Precision Ball or Super Precision Roller spindle bearings. (the finest bearings obtainable). Heavy braced, semi-steel beds with hand scraped ways (2 V-ways and 2 flat ways). These lathes come with a choice of aprons, gear boxes, and drives including the anti-friction, 4-speed, V-belt Lever-operated pedestal base motor drive illustrated. Telescopic Taper Attachment and other accessories available.



For Production

Sheldon Lathes will stand up to any production work within their capacity—are ideal for second operation work. Production models available with any or all of these features: Ultra-Precision Ball or Super-Precision Roller spindle bearings. Lever-operated Collet Attachment. Lever-operated Tail Stock. Lever-operated cross slide with double tool post. Lever-operated turret, etc.

For Machine Shop

Both Bench and floor, models with choice of Semi-quick or Full-quick Change Gears. Plain Aprons or Worm Feed Apron with Power Cross Feed. Overhead, Back or Underneath Motor Drives—Telescopic Taper Attachments, Tool Post Grinders, Milling Attachments and all standard accessories.

Write for Catalog and name of nearest distributor.

SHELDON MACHINE CO., INC.
4252 N. KNOX AVE. CHICAGO, U.S.A.

Amco GAGES ARE UNEXCELLED FOR QUALITY, ACCURACY AND SERVICE.

Illustrated below are Male and Female Splined Gages made to One Ten-Thousandths of an Inch Tolerance.

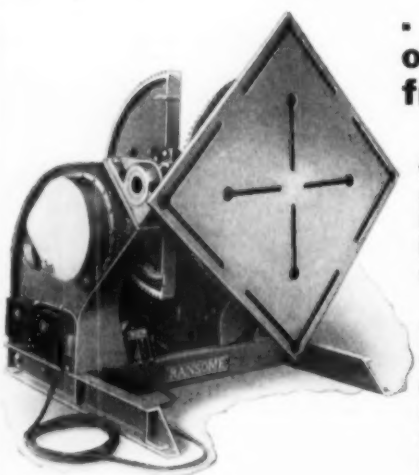
OUR PRODUCT

Straight Side, Serration, Involute Male and Female Splined Gages, Plug, Ring, Snap, Flush Pin, Profile, Fixture, Length, Width, Thickness and Relation Gages. We have a complete Spline Engineering Service for your convenience. Gages with close tolerances are normalized and stabilized. All gages are inspected at 68° Fahrenheit. May we quote on your requirements.

AMCO GAGE COMPANY

19760 West Eight Mile Road — Detroit, Michigan

FOR ALL DOWNHAND WELDS



. . . a tilting range of 135 degrees from horizontal

With a tilting range of 135 degrees from horizontal, Ransome Positioners provide the means to weld DOWNHAND any and all welds no matter how complicated the piece to be welded.

Reports from many users indicate valuable time savings . . . which means more welding production in a given time over methods formerly used. Give us your welding production problems — our engineers will supply the answers.

Capacities from 2500 lb. Hand-Operated to 20 ton Motor-Operated

Ransome WELDING POSITIONERS

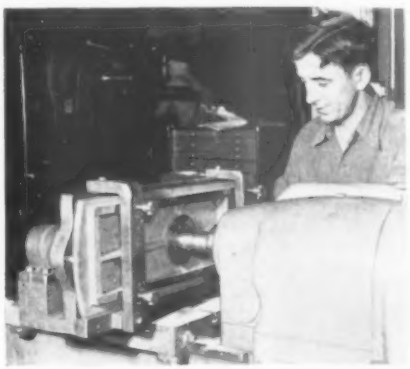
INDUSTRIAL DIVISION • RANSOME MACHINERY COMPANY • DUNELLEN, NEW JERSEY

THE CRIB

(Continued from page 218)

High Speed Boring on Lathe

HIGH SPEED BORING of machine parts is done on 10-inch tool room lathes at the Monarch Machine Tool plant. Reversing usual lathe practice, the work is held stationary while the tool revolves.



Instead of the regular conventional type lathe carriage, a platen carriage which readily accepts fixtures for holding a varied class of work is provided. Shown is the boring of the swivel pin bearing hole of a taper attachment slide.

In adapting this particular model of lathe to boring, it is possible to take advantage of infinite selection, of spindle speeds. The exactly correct surface cutting speed is obtained.

Drill Jigs Mounted to Drilling Machine Table

BY BOLTING three drill jigs to the table of a four spindle drill machine in a Westinghouse plant, the necessity of the operator centering the fixture under the drilling spindle has been eliminated. This permanent mounting, replacing moveable fixtures which the operator has to move around on the table, has naturally facilitated production.

The operator lifts the drill jigs by raising the hand crank with his left hand and replaces the piece to be drilled with his right hand. When the drill spindle has descended a predetermined distance, it lifts automatically. The drilling cycle permits the operator to load and unload the three drill jigs. He performs the burring operation during the time required for drilling. One spindle is used for removing burrs.

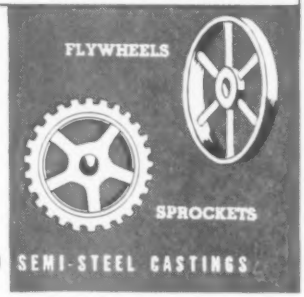
THE END.

Pyott Multiple V-Belt Drives conform to all the engineering specifications established by Multiple V-Belt Drive Association.

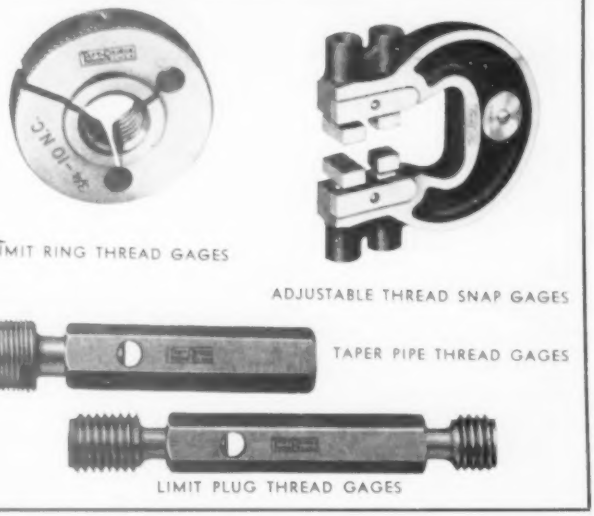
PYOTT

FOUNDRY & MACHINE CO.
328 NORTH SANGAMON STREET · CHICAGO

Put your drive problem up to Pyott for constructive suggestions. Descriptive literature sent upon request.



ALSO GREY IRON AND SEMI-STEEL CASTINGS



TAFT-PEIRCE THREAD GAGES

YEARS AGO, the first educational shell orders called up for service the Taft-Peirce line of Thread Gages. Since then, the Taft-Peirce Thread Gage Department has doubled, redoubled—now reaches a size where it has had to be moved into a six-story plant of its own, adjacent to the main plant.

Here, production shifts into higher speed than ever, assuring prompt service on the complete Taft-Peirce Thread Gage line, which includes all AGD Standards and many special types. This line is shown in the Taft-Peirce Handbook. A line on your letterhead brings a copy to your desk. The Taft-Peirce Manufacturing Company, Woonsocket, Rhode Island.

USE TAFT-PEIRCE GAGES
for every gaging need

ARMSTRONG

Uniform clean-cut knurling always

● Your knurling can be no better than your knurls and the tool that holds them. Standardize on ARMSTRONG Hobcut Knurls — the sharper deep cut, accurately formed patterns. Use them in the ARMSTRONG Knurling Tool which is automatically self-centering, which automatically equalizes pressure on knurls and "tracks" accurately. Knurls are held in a large knuckle joint that has strength to withstand tremendous side and end thrust. Write for Catalog C-39.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
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LOOK!

next month for Sterling's

NEW SANDER

Outstanding Development in Its Field.
Speeds War Production.

STERLING TOOL PRODUCTS CO.
373 East Ohio Street • Chicago, Illinois

THE PASSING PARADE . . . .

The Ever-Changing Scene in Mass Manufacturing

• *ALEXANDER C. BROWN* of Cleveland was recently appointed as deputy chief of the Iron and Steel Branch of the WPB. Mr. Brown has been first vice president of the Cleveland Cliffs Iron Company since 1934.

• *IRA MOSHER*, vice president and general manager of the American Optical Company, Southbridge, Mass., has been elected president of the Associated Industries of Massachusetts. Other officers include *JOHN F. TINSLEY*, president of Crompton & Knowles Loom Works, Worcester, chairman of executive committee on national defense matters: *WILLIAM H. COLLINS*, general manager of the Bethlehem Steel Company's ship building division at Quinch, first vice president; *ROE S. CLARK*, treasurer of Package Machinery Company, Springfield, second vice president; *HAROLD J. WALTER*, treasurer of Uxbridge, third vice president; *HARRY E. D. GOULD*, assistant to the vice president, retired, Bethlehem Steel Company, shipbuilding division, Quincy, honorary vice president; *SAMUEL T. MACQUARRIE*, American Optical Company, Southbridge, treasurer; *JOHN A. MADDOCKS*, division manager, Gulf Oil Corporation at Boston, assistant treasurer and *JOHN E. DANIELS*, legislative secretary of Associated Industries, secretary to the executive committee.

• *DARRELL W. MORGESON* has recently been appointed tool superintendent of the Aircraft Division of Willys-Overland Motors, Inc. at Toledo, Ohio. A member of the American Society of Tool Engineers, Mr. Morgeson will be in charge of all planning, processing, specification, and procurement of equipment and tools for the production of aircraft projects at Willys. He was formerly with the Bendix Products Corp. as superintendent of apprenticeship training. While at Bendix Corp. he was also editor of the Bendix Beacon and process engineer and estimator on landing gears.

(Continued on page 224)

DARRELL W. MORGESON
Now tool superintendent.

aids to
MANPOWER
problems

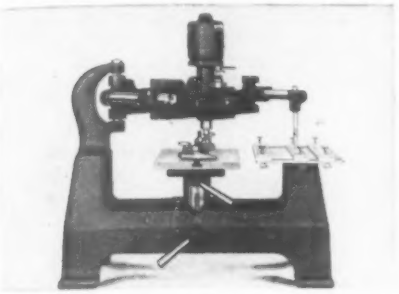
STANDARD AVEY MACHINES adaptable to special production

The saving of hours to produce a given part is—CONSERVATION OF MANPOWER. This vital problem has been considered in the designing of the AVEY MA-6 (No. 2 and No. 3 sizes). We illustrate a group of Standard Avey MA-6 machines, equipped with Multiple Spindle Drillheads, designed for specific operation. Featuring Push Button Control, Two Speed Motor, three mechanical changes through gearing. 8 to 1 speed range. Any spindle may be equipped with Aveymatic Feed, Hand Feed or Tapper. Our engineering staff will welcome your inquiry regarding particular problems.

CINCINNATI · OHIO *Avey* DRILLING MACHINES

AVEY DRILLING MACHINE COMPANY, CINCINNATI, OHIO, U.S.A.

For Precision Marking In War Production . . .



ENGRAVER
PANTO ACID ETCHER
ELECTRIC MARKER

. . . three machines in one

A compact precision bench-type pantographic machine, with interchangeable heads . . . for engraving instrument dials, name plates, etc. . . . and for acid etching or electrically marking tools and parts—heat-treated or annealed—on flat, concave, or convex surfaces.

Illustration shows machine with engraving head attached.

» *Write for Literature*

H. P. PREIS ENGRAVING MACHINE CO.
161C SUMMIT ST. NEWARK, NEW JERSEY

ORIGINATORS and exclusive manufacturers of DUBLIFE GAGES and UPPCO FINISH

DUBLIFE

Reversible PLUG GAGE

tells DEPENDABLY long after ordinary gages are worn out.

TWICE THE SERVICE

and more, is insured by DUBLIFE'S reversible Plugs—both "Go" and "No Go" in same hexagonal handle. Either plug easily turned end for end when worn. Securely locked by bronze collet. *Send for Catalog showing DUBLIFE and other gages of A. G. Design. Write.*

UNITED PRECISION PRODUCTS CO.

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T. H. L. FRONT LEVER

BENCH PUNCH

Built for hard tough work — die cannot lose alignment with punch — all parts interchangeable.

Capacity ½" holes through $\frac{1}{16}$" steel; $\frac{13}{32}$" through ¼" steel. Can also be made for holes up to ⅞" in thinner metal. Stock punches and dies available from $\frac{1}{16}$" to ½" by 64ths.

Weight, 70 lbs.

PRICE WITH ONE PUNCH AND ONE DIE—

$50.00

Immediate Shipment

T. H. LEWTHWAITE MACHINE CO.
(Est. 1890)
307 E. 47 St. NEW YORK

PRECISION THREAD MILLER

FULL AUTOMATIC CONTROL

INTERNAL OR EXTERNAL RIGHT OR LEFT — UP TO 7 INCH DIAMETERS
COMPLETE MOTOR EQUIPMENT — FIXTURE TO SUIT

The James **COULTER** *Machine Co.*
BRIDGEPORT • CONNECTICUT • U. S. A.

• *JULIUS CLAUSS* of Detroit, has been appointed assistant on production problems to *HIGHLAND G. BATCHELLER*, chief of the Iron and Steel Branch, WPB. Mr. Clauss was chief engineer of the Great Lakes Steel Corp. before accepting the WPB appointment.

• *T. E. TILLINGHAST*, sales manager of Pratt and Whitney Aircraft, East Hartford, Conn., was recently elected president of United Aircraft Service Corporation, a subsidiary of United Aircraft Corporation.

• *LESTER H. LANCASTER* has been named general superintendent for the branch plant of the Pratt and Whitney division of the United Aircraft Corporation, to be opened shortly at East Longmeadow, Mass. THOMAS F. KAHOE was named superintendent of the Willimantic plant and JOHN S. ROBERTSON of the Southington plant.

• *HARRY CRUMP* has joined Carboloy Company, Inc. as assistant to the sales manager, *K. R. BEARDSLEE*, it was recently announced. With General Electric Company in Schenectady for the past 26 years, Mr. Crump, since 1929 has been development engineer on carbide tool applications. Chairman of the Schenectady Chapter of the American Society of Tool Engineers for the current year, he was active in training work in the Schenectady area since the inception of war.

HARRY CRUMP
Joins Carboloy staff.

• *ALLEN P. LIVAR*, recently appointed chief engineer of the Airtemp Division, Chrysler Corporation. Serving with Airtemp since 1937, Mr. Livar is a veteran in the heating and air conditioning industry and had previously been with the Richmond Radiator Company.

ALLEN P. LIVAR
Chief Engineer for Air temp.

• *RUSSEL L. WHITNEY* was recently appointed sales manager of

(Continued on page 226)

Research Laboratories need Versatile Saws

The New Kensington, Pa. research laboratory of the Aluminum Company of America uses the two MARVEL No. 8 Metal-cutting Band Saws, pictured here, to cut test specimens from alloy steels and aluminum alloy products of every shape and description, varying from 1/16" to 18" thick. The MARVEL No. 8 in the foreground has been in continuous service for 11 years and proved so "well suited for the large variety of sizes and shapes to be sawed", that the modern MARVEL No. 8 behind it was added.

Buy from your local distributor.

ARMSTRONG-BLUM MFG. CO.

"The Hacksaw People"

5700 Bloomingdale Ave. Chicago, U.S.A.

Eastern Sales Office: 225 Lafayette St., New York

Sellers 4T Tool Grinder

SEND FOR COPY OF 4T BULLETIN

WILLIAM SELLERS & CO., INCORPORATED

1636 HAMILTON STREET, PHILADELPHIA, PA.

FOUNDED SELLERS 1846

Sellers

SCREW MACHINE SETUPS

Complete for **B & S AUTOMATICS**

Our years of experience in tooling automatic screw machines on ordnance parts can help you take care of your requirements when delivery and quality are so essential as in the present emergency.

CAMS AND TOOLS FOR SCREW MACHINES

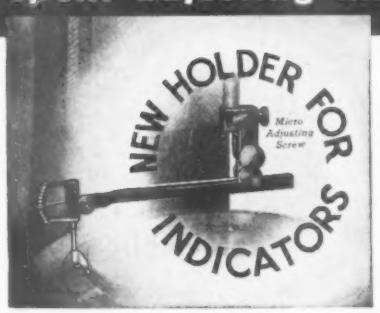
GEORGE L. DETTERBECK CO.

FORMERLY BANNER MFG. CO.

1871 CLYBOURN AVENUE

CHICAGO, ILL.

Save 60% TIME spent adjusting indicators



For Jigborers, Boring Mills, Milling Machines. It fits all popular indicators. The above illustration shown complete with extension bar.

NO more tiresome tapping your indicator into position. Now — after locking to approximate position, you obtain final setting by simply turning Micro Adjusting Screw. This exclusive, time-saving feature of the OSLUND HOLDER for all popular indicators gives you ***complete control.*** Write today for details.

ANOTHER TIME-SAVER

This Holder produced by makers of Oslund Indicators — the shockproof, constantly accurate indicator, whose 360° dial is read from ***all*** sides. Write Oslund today.

Oslund TOOL & DIE CO.

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Hanna AIR & HYDRAULIC Cylinders

ON 1001 jobs Hanna Cylinders simplfy and improve operation; save time and labor; help increase production.

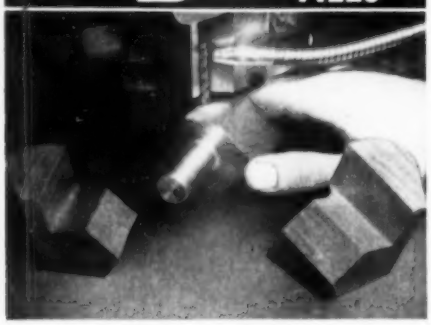
Where can you make use of Hanna Cylinder Power as suggested in these illustrations? Write for Catalog 230.

HANNA ENGINEERING WORKS

1765 ELSTON AVENUE • CHICAGO, ILLINOIS

RIVETERS • CYLINDERS • AIR HOISTS

File Continuously with DoAll BAND FILES



They handle every kind of tough job — Stainless Steel, Brass Castings, Copper, Plymetal, Hard Rubber, Slate, Synthane, Duralumin, Magnesium — whatever you have that requires filing.

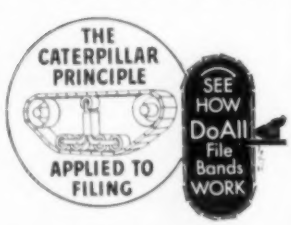
DESIGNED FOR TODAY'S TEMPO

DoAll Band Files give you CONTINUOUS cutting, so are far ahead in stamina and performance. And as for speed, well, they're 8 times as fast as hand filing, 5 times as fast as jig filing. So, stop fiddling around with old-time methods. Put DoAlls to work in your plant and get your jobs done! Remember this — there's no back stroking, but steady, even, one-way travel.

23 DIFFERENT SIZES

You will find a width, cut and style DoAll Band File to handle just about everything. Each one is precision built to give long, satisfactory service.

Send today for interesting book on DoAll Band Filing.



THE DOALL COMPANY

1211 Thacker St., DesPlaines, Ill.

Associated with Continental Machines, Inc., Minneapolis, Minn.

—PASSING PARADE—

Westinghouse Company's Transformer Division in Sharon, Pa.

• *JOHN B. JENKINS* was recently appointed as manager of the Hydraulic Division of The Twin Disc Clutch Company, Racine, Wisconsin. The Hydraulic Division of this concern is located at Rockford, Illinois. Mr. Jenkins has been in charge of the company's factory branches at St. Louis, Tulsa and Dallas for the past eight years.

• *DAN C. HUNGERFORD* has been elected president and general manager of the Aircraft Parts Development Corp. at Summit, New Jersey. Mr.

DAN C. HUNGERFORD
New president for Aircraft Parts.

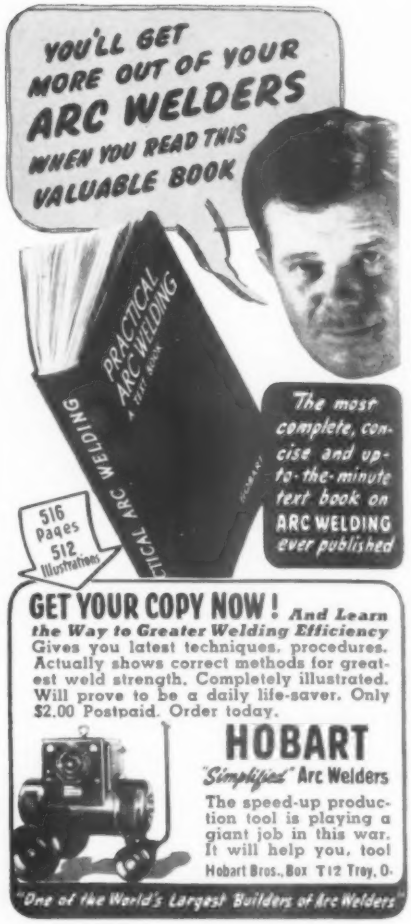
Hungerford, formerly vice president of the Elastic Stop Nut Corp., has also been president of the Standard Manufacturing Company at Corning, New York.

• *HENRY COWDREY*, president of the C. H. Cowdrey Machine Works of Fitchburg, Mass. and MRS. COWDREY, recently celebrated their 60th wedding anniversary with a family dinner.

• *GEORGE M. STEVENS* was recently appointed acting manager of the General Electric Company's River Works at Lynn, Massachusetts. Mr. Stevens has been with General Electric since 1899. Also recently announced was the appointment of *CARL A. SALMONSEN* as assistant manager of this plant.

• *NICHOLAS M. DU CHEMIN* has been recently appointed as acting manager of General Electric Company's West Lynn Works at Lynn, Massa-

(Continued on page 228)


YOU'LL GET MORE OUT OF YOUR ARC WELDERS WHEN YOU READ THIS VALUABLE BOOK
PRACTICAL ARC WELDING
A TEXT BOOK
516 Pages 512 Illustrations
The most complete, concise and up-to-the-minute text book on ARC WELDING ever published
GET YOUR COPY NOW! And Learn the Way to Greater Welding Efficiency
Gives you latest techniques, procedures. Actually shows correct methods for greatest weld strength. Completely illustrated. Will prove to be a daily life-saver. Only $2.00 Postpaid. Order today.
HOBART
"Simplified" Arc Welders
The speed-up production tool is playing a giant job in this war. It will help you, too!
Hobart Bros., Box T12 Troy, O.
"One of the World's Largest Builders of Arc Welders"

FOR SPEEDY DRILLING OF SMALL HOLES

Drills more holes per minute.
Drills holes from 1/32" — in some metal to 3/8".
Used singly or in multiples.
Mounts on any angle.
Has in-built brake.
Quickly removable for other work.
Doesn't break small drills.

GOVRO-NELSON

AUTOMATIC DRILLING UNITS

PATENTED PROVEN PROTECTED

CENTRIFUGAL FEED

"HOLE"

ENGINEERING SERVICE

5901 FOURTH AVE. DETROIT, MICH.

Mark Iron, Steel and Carbides the

Etchograph Way

•

2000 IN USE

NEW JUNIOR MODEL

Buy the Original Electric Etcher

Three sizes to meet all requirements. Also a combined Etchograph and Demagnetizer.

With New ELKONITE TIP Pencil

Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides — quickly — plainly.

Write for circulars and prices.

BREWSTER-SQUIRES COMPANY
54 Church Street
NEW YORK, N. Y. U. S. A.

Rawhide HAMMERS MALLETS

Carefully made, accurately balanced, with weighted heads where extra striking power is needed. Strike forceful blows without marring or battering, without recoil or bounce. Never split, chip, "smear" or crack, retain this true striking face so every blow goes right to the target . . . gets work done. Long wearing, mechanically cured, coiled Rawhide faces far outlast soft metals, plastics, wood or rubber.

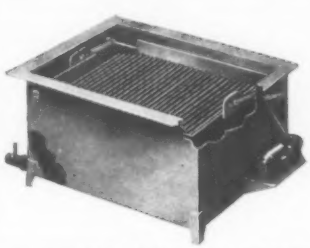
Replaceable Heads

Replaceable Insert Faces are available for C.R. Hammers . . . make each a "lifetime" tool.

CHICAGO Rawhide MFG. CO.
1393 ELSTON AVE. ★ CHICAGO, ILLINOIS.

LOW COST — EFFICIENT Metal Parts CLEANING

STURDY-BILT *"SIMPLEX"*
Metal Parts CLEANER



This small, compact, automatic and mechanically simple unit combines the two most positive methods of cleaning Metal Parts, Assemblies, Shells, Cartridges, Castings, Stampings, etc. A swishing action positively removes all grease, oil, dirt and metal chips that have been loosened during the "chemical action" of the "soak". Can be installed in different departments or in a series — one unit for cleaning, another for rinsing or rust prevention coating and others for special requirements. Send for "Simplex" bulletin for complete details.

and for
CONTINUOUS
Large Scale
PRODUCTION

. . . the STURDY-BILT *"Soaker-Hydro"* CLEANER

Combines long agitated "soak" with hydro washing action for large production. Parts are loaded onto trays, passed through the soaking tank — then are rinsed to remove oil film and clinging chips — then subjected to a power wash. They are removed dry and ready for use or for the next manufacturing operation. Simplicity is the keynote of construction as well as operation. Send for complete details.

STURDY-BILT EQUIPMENT CORP.
Department T-12 WEST ALLIS, WISCONSIN

UNIVERSAL FLOATING CHUCKS FOR HORIZONTAL OPERATION

For use where piloting from the lead hole is required.

Designed for horizontal operation in automatic screw machines and turret lathes, Universal Floating Chucks are ideal for drilling, counterboring and reaming. Adjustable spring pressure compensates for tool weight thus preventing scored holes. Write for complete facts and prices.

UNIVERSAL ENGINEERING CO.
FRANKENMUTH · MICHIGAN

A POINT TO CONSIDER

...DUST CONTROL IN YOUR PLANT

Today, more than ever, "dust control" is recognized as an important necessity to industry.

"All out" war production must not be impaired by machine breakdowns or lost man hours.

Torit self-contained, portable Dust Collectors will solve your dust problems, simply, efficiently and economically.

● **Write today for bulletin giving Torit features, specifications, prices, or give us your "dust problem" and let us recommend a solution without obligation.**

TORIT
Manufacturing Co.
281 Walnut St.
St. Paul
Minnesota

TORIT
Dust Collectors
SELF-CONTAINED UNITS

chusetts. Mr. Du Chemin first started working with General Electric as an apprentice machinist in 1914 at the River Works.

• *ARTHUR LAMB* has been appointed general plant superintendent, and *ANDREW E. RYLANDER* master mechanic, at Midland Steel Products Company, Detroit plant. Mr. Lamb has been with the company some 25 years, the past 12 as production manager. He succeeds *JOHN J. BOE*, recently appointed works manager, and, like most Midland executives, comes up from the ranks.

Mr. Rylander, who has been with Midland since 1935 as methods and developments engineer, served in a consulting capacity during the Company's conversion program. Largely a product of the practical school, he has a broad industrial and engineering background and has contributed considerably to production methods and tool engineering.

• *W. E. GRIFFITHS* has been appointed assistant manager of sales of Flat Rolled Products for the Allegheny Ludlum Steel Corporation, it was recently announced.

• *EDWARD S. COE, JR.* has been named manager of the New York office of the Farrel-Birmingham Company, it was recently announced. With this concern since 1936, Mr. Coe had previously worked at the Trenton and Worcester plants of the American Steel & Wire Company.

• *D. A. MACKINNON* was recently appointed as hydraulic sales engineer for Hydraulic Machinery, Inc., Detroit. Previous to this new position with Hydraulic Machinery, Mr. MacKinnon has been with Sundstrand Machine Company and Vickers, Inc.

• *JOHN BERRY, JR.*, assistant treasurer at Bell Aircraft Corporation, has been appointed to the new office of Comptroller, it was recently announced.

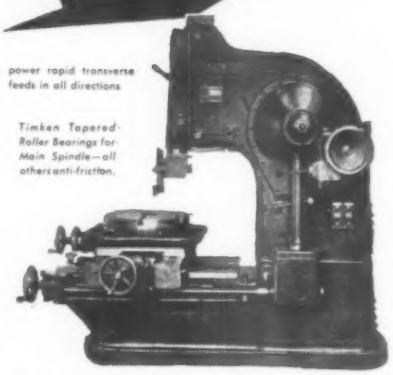
• *GEORGE B. SHAW* has recently been appointed as a sales engineer with the Keystone Carbon Company of Saint Marys, Pa.

• *CANADIAN - FAIRBANKS - MORSE COMPANY, LIMITED*, will handle exclusively all Canadian

(Continued on page 230)

Accurate, High-Speed
MOREY VERTICAL SHAPERS
SELF-CONTAINED MOTOR DRIVE

8" STROKE
12" STROKE


power rapid transverse feeds in all directions
Timken Tapered Roller Bearings for Main Spindle—all others anti-friction.

Built to highest accuracy standards the MOREY VERTICAL SHAPER is simple for tool-room manufacturing. Power feeds and power rapid transverse feeds in all directions are instantly available in all operating positions.

Ask for Circular 726

MOREY MACHINERY CO., INC.
410 Broome Street New York, N. Y.

GARRISON
GEAR CHUCKS
are used on—

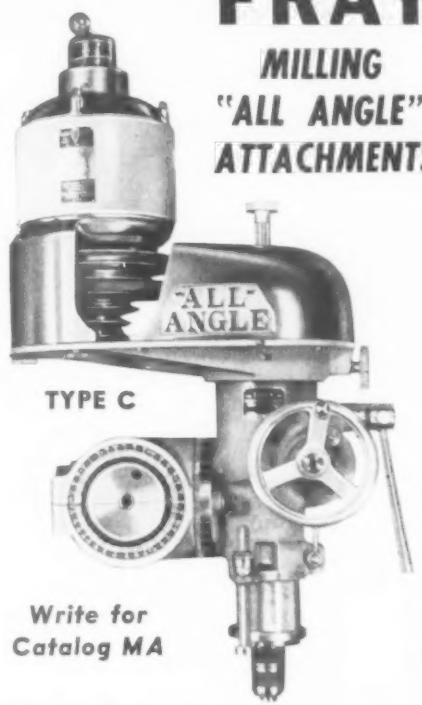
- GEAR SHAPERS
- DRILL PRESSES
- ENGINE LATHES
- TURRET LATHES
- INTERNAL GRINDERS
- EXTERNAL GRINDERS
- OSCILLATING GRINDERS
- DIAMOND BORING MACHINES
- HORIZONTAL BORING MILLS

and are used for—
Grinding . . . Precision Boring . . . Machining and other operations on Spur . . . Internal . . . Bevel . . . Cluster . . . Helical and Herringbone Gears.

GARRISON
MACHINE WORKS, INC.
DAYTON OHIO

FRAY

MILLING
"ALL ANGLE"
ATTACHMENTS



TYPE C

Write for Catalog MA

★ ★ ★

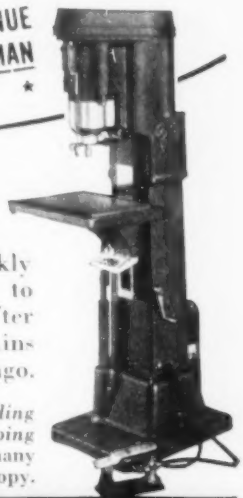
FRAY MACHINE TOOL CO.

505 W. Windsor • Glendale, Calif.

★ ★ ★ ★ ★ ★ ★

LONG AFTER VICTORY IS WON

HASKINS TAPPERS WILL CONTINUE TO BRING LOWER COSTS PER MAN AND MACHINE HOUR ★ ★ ★



Haskins Tappers bought for today's war needs are *standard* machines. They can be quickly and inexpensively converted to private industry production after Victory is won. R. G. Haskins Co., 2756 W. Flournoy St., Chicago.

NEW BOOKLET — *"Holding Fixtures for Haskins Tapping Machines"* — contains many new ideas. Send for a copy.

HASKINS

HASKINS *Precision* TAPPING EQUIPMENT

NO JOB TOO BIG for our research department

The "HARDSTEEL" drill is biting its way through a 17% manganese rail. Work hardening at its worst — all the way. Twelve feet long, weight 650 pounds. 55 1/4" holes drilled — 1-3/4" through — average time: two minutes each. Each hole finished to glass smooth wall. Good production life between grinds.

Every day our research department is drilling customers' samples to prove the claims we make for "HARDSTEEL" drills — their ability to drill oil-hardened, water-hardened, work hardening, cyanided and nitrided pieces, high carbon — high chrome, and high speed steels of any degree of hardness — without annealing.

"HARDSTEEL" is also available in reamers, tool bits and special tools.

HARDSTEEL DRILLS

You harden it — we'll drill it with "HARDSTEEL"

Write for literature

BLACK DRILL CO., 5005 EUCLID AVE., CLEVELAND, OHIO

REAMERS • TOOL BITS

Douglas 32" X 8" PLAIN MILLER

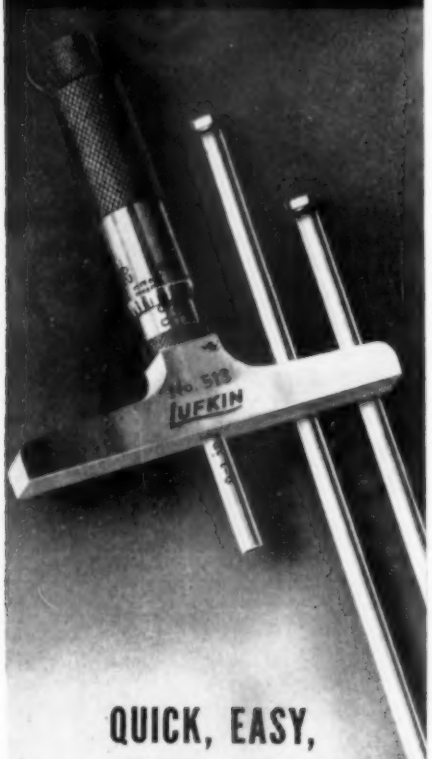
FOR SMALL PARTS PRODUCTION

DOUGLAS MACHINERY CO. INC.

150 BROADWAY NEW YORK, N. Y.

LUFKIN

MICROMETER DEPTH GAGES



QUICK, EASY, ACCURATE READINGS

Easy to read because of the Lufkin "Rapid Reading" system (each thousandth numbered). Lufkin Micrometer Depth Gages are the choice of leading engineers. Patented lock nut maintains readings, often preventing errors. Adjustable nut on rods compensates for wear. Knurled base makes for easier, surer handling. Extra rods allow range from 0 to 3 inches. Write for free catalog.

BUY THROUGH YOUR DISTRIBUTOR

LUFKIN

SAGINAW, MICHIGAN • New York City

TAPES · RULES · PRECISION TOOLS

distribution of P & H welders and electrodes manufactured by the Harnischfeger Corporation at Milwaukee, it was recently announced.

• *UNITED PRECISION PRODUCTS COMPANY* announces a new business address, 3524 West Belmont Avenue, Chicago.

• *ALBERT WRIGHT* recently announced the new address of his concern at 4062 Hollis Street in Oakland, California.

• *BENNEL MACHINE CO., INC.* recently announced its new general office and plant which will be located at 20 Grand Avenue, Brooklyn, New York.

• *GROBET FILE CO. OF AMERICA* recently announced its removal to larger quarters at 421 Canal Street, New York City.

• *HYDRAULIC MACHINERY, INC.* recently announced the construction of a new plant at 12801 Ford Road, Dearborn, Michigan. When completed, the new building will combine under one roof the activities which have been carried on at the plant on Elizabeth and general offices at 10421 Grand River.

Died

• *CHARLES HOTCHKISS NORTON*, 91, long associated with Norton Company of Worcester, Mass., died on October 26th at Plainville, Conn. Known as the father of cylindrical grinding, Mr. Norton first became associated with the Norton Com-

CHARLES H. NORTON
Father of cylindrical grinding.

(Continued on page 232)

M-B SUPER-SPEED Pneumatic GRINDER Model SS-SR

The only hand grinder with spindle speed of 100,000 R. P. M. on 100 pounds air pressure. It has revolutionized hand grinder performance. Can be directed in any working position; operates with extreme ease. Steel construction throughout. Formed to fit the hand.

A 100,000 R.P.M. UNIT AMAZING SPEED and POWER

Also Other Models, and Air Line Filters and Automatic Air Line Lubricators.

Write for Circular and Details of FREE TRIAL OFFER.

M-B PRODUCTS • EXPORT OFFICE 44 WHITEHALL ST. New York, N.Y., U.S.A.
130 E. LARNED ST., DETROIT, MICH.

TO HELP YOU TEACH THE NEW GRINDER HAND

how to get maximum service from your Diamond Tools—we have some effective training material. Send for it. No obligation.

KOEBEL DIAMOND TOOL CO.
9442 Grinnell Ave., Detroit

KOEBELITE DIAMOND TOOLS

Multi-Point, Multi-Set, Multi-Edge, and Single Set. Diamonds for All Industrial Purposes.

Reclinable POWER PRESSES

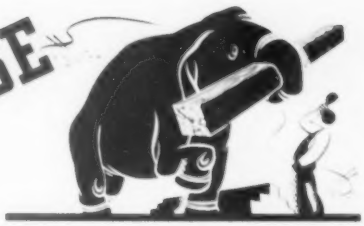
This press has long been considered the most suitable and favored type for general stamping work. Its features have been standard for a number of years, but many important improvements in details make the latest model outstanding. Its high performance is the result of thorough research, sound engineering and careful designing.

The Type 36 Press is available either plain or back geared, and the models range from 4 to 100 tons capacity.

Complete information on this and other Z & H presses will be sent on request.

ZEH & HAHNEMANN CO.
192 VANDERPOOL STREET, NEWARK, N. J.

LOOKING FOR A
BIG VISE



...FOR THAT BIG JOB

You'll find the answer in the Rousselle — ruggedly built for today's Wartime demands—precision-finished for your new high standards of accuracy. The Victory Vise is built to cut set-up time in half. Early deliveries to War Industries.

Write for Vise Bulletin TE-122 and prices.
(Dealers: a few select territories still open)

Made in four desirable capacities.

DAVID J. ROSS COMPANY
BENTON HARBOR, MICH.

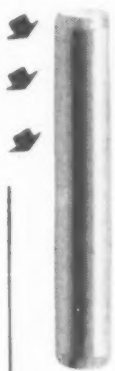
U S HEADS
STANDARD SINCE 1915

30 DIFFERENT STANDARD SIZE ADJUSTABLE DRILL HEADS, CAPACITIES UP TO 1½" DRILLS

SEND US YOUR B/PS

All Types of Fixed Center Heads

UNITED STATES DRILL HEAD CO.
Cincinnati, Ohio



DANLY *Precision* DOWEL PINS

All Die Makers' Supplies

Danly Precision Dowel Pins

Danly Commercial Sets

Danly Special Sets

DANLY MACHINE SPECIALTIES, INC.
2100 S. 52nd Avenue, Chicago, Ill.
MILWAUKEE • LONG ISLAND CITY, N. Y.
DAYTON • DETROIT • ROCHESTER
CLEVELAND • PHILADELPHIA
Ducommun Metals & Supply Co.
Los Angeles • San Francisco

DANLY PRECISION DIE SETS

Preloaded Precision Bearings for Spindles

MOREY 12M HIGH-SPEED VERTICAL PROFILER and MILLER

Two spindle or single spindle

Speed and more speed in the production of interchangeable parts requiring milling of any contour or outline is yours in the MOREY 12M. Provision for increased clearance between spindles and table.

Ask for Bulletin 680-A

MOREY MACHINERY CO., INC.
410 Broome Street New York, N. Y.

RUTHMAN
GUSHER
COOLANT PUMPS

IT'S NEW!
MODEL 5-P3

Mounting flange of this new Gusher Pump comparatively large. Interchangeable with larger Gushers. Adaptable to changed conditions. Right or left discharge. 1/10 h. p. Capacity: 10 g. p. m. There's a Gusher Pump to meet your needs.

Write for engineering data and specifications

THE RUTHMAN MACHINERY CO.
1815 READING ROAD, CINCINNATI, OHIO
LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

LESS OPERATIONS
AND FAR
BETTER WORK
WITH A
GATCO
ROTARY PILOT BUSHING

Pilot and bushing fits with a PUSH fit, therefore a perfect bore

ROUND-CHATTERLESS-SMOOTH

DUST-PROOF

AS A WATCH

GATCO Rotary jig and pilot bushing is built for core drilling, diamond boring, turret tool piloting, piloting hollow mills, line reaming, carbide boring, spot facing, etc.

Write for full information and prices

GIERN & ANHOLTT TOOL COMPANY
1312 Mt. Elliott Avenue, Detroit, Michigan

pany in 1900 when the then Norton Emery Wheel Company founded the Norton Grinding Company with Mr. Norton as designer and chief engineer. In this capacity Mr. Norton introduced his methods of cylindrical grinding and manufactured machinery of his invention and design. When the Norton Grinding Company was merged with Norton Company in 1919, he became chief engineer with the machine division. The holder of more than 100 patents, Mr. Norton was awarded the John Scott medal for the invention of accurate grinding devices of high power by the University of Pennsylvania in 1925.

• *JAMES S. NORTH*, former industrialist, died recently at New Haven, Conn. after a long illness. Mr. North was connected with the Stanley Works at one time, then operated as the New Britain Hardware Company, associated with Corbin Screw Corp., and also served as president of C. J. White Company.

• *FRANK J. WESCHLER*, 59, vice president and general manager of the Baldwin-Duckworth division of the Chain Belt Co. died suddenly in Memorial Hospital at Worcester, Mass.

• *FRANK T. KARCH* of the Standard Register Company at Dayton, Ohio and a member of the American Society of Tool Engineers, died recently in Dayton. Mr. Karch was with the National Cash Register Company for 32 years. Previous to his last position, he was a tool planner for the Aeroproducts Division of General Motors Corporation. When foreman of the tool planning department he left that position to set up a tool planning department of the Standard Register Company.

• *NELSON JARVIE DARLING*, 58, manager of General Electric West Lynn and River Works, died October 26th at his Beach Bluffs home after an illness of a few months.

For the Latest News in New Equipment for Mass Manufacturing, Please Turn to Page 172.

EVEREDE
TWO-STEP
BAR

The ONLY Boring Bar with the economical triangular bit.

Designed to use a larger bar diameter as the bit cuts ahead of the bar. This insures rigidity, making higher boring speeds and heavier cuts possible.

Everede Boring Bars are made of the finest heat treated nickel steel and each bar is furnished with six triangular high speed steel bits.

The Everede Boring Bar also permits the use of a solid stellite or carbide tool bit by clamping the bit in the "V" Type grip holding it firmly without danger of breakage.

Write for Descriptive folder.

EVEREDE TOOL CO.
WILLIS STUTSON
184 N. Wacker Drive Chicago
Representatives in principal cities

A GIANT WORKER
SAVES THOUSANDS OF HOURS DAILY

GROB FILING MACHINE
"THE TOOLMAKER'S BEST FRIEND"

SHOULD BE IN EVERY SHOP

Unmatchable performance for most difficult sawing and filing of tools and dies.

Compact, powerfully built, for rigorous shop service.

It cuts with a continuous flow of chips and removes stock like a milling machine.

Write or wire for details and prices

GROB BROTHERS
GRAFTON WISCONSIN

SPEEDING up production through use of simple jig which holds tubular framework during welding operation.

ALL SIZES
ALL TYPES

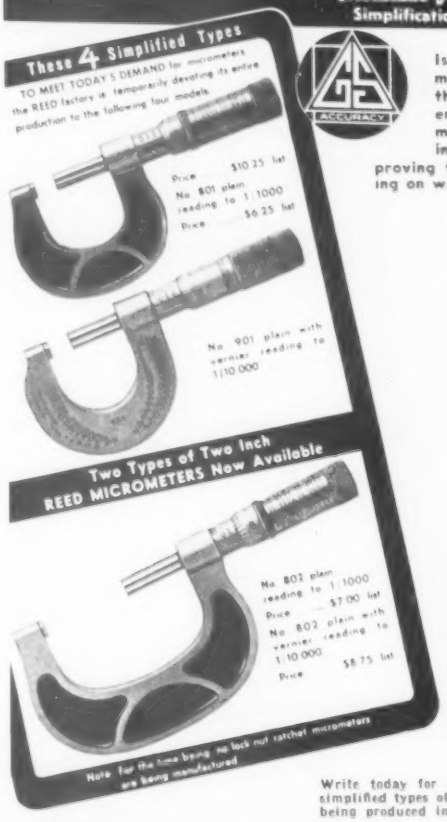
DE-STA-CO *Toggle* CLAMPS

assure quick, positive clamping and easy, instant release. When you design fixtures for holding parts during welding, machining, reaming, inspection, drilling, assembly or similar operations always specify De-Sta-Co Toggle Clamps . . . built in all sizes from the small 9¼ ounce aircraft model up . . . every clamp carefully engineered to assure ease of operation without undue looseness.

Bulletin No. 41 illustrates many uses . . . sent free, on request.

DETROIT STAMPING CO.
Established Over 25 Years
356 Midland Ave • Detroit, Mich.

The REED Policy of PLANT EXPANSION
Increased Production
Simplification of Models


These 4 Simplified Types
TO MEET TODAY'S DEMAND for micrometers the REED factory is temporarily devoting its entire production to the following four models
Price $10.25 list
No. 801 plain reading to 1/1000
Price $8.25 list
No. 901 plain with vernier reading to 1/10,000
Two Types of Two Inch
REED MICROMETERS Now Available
No. 802 plain reading to 1/1000
Price $7.00 list
No. 802 plain with vernier reading to 1/10,000
Price $8.75 list
Note: For the time being, no lock nut ratchet micrometers are being manufactured

Is aiding us to deliver micrometers to plants that can furnish preference ratings and to mechanics who can fill in our simple form proving that they are working on war production.

Four Reasons for the increasing Popularity of REED Micrometers:

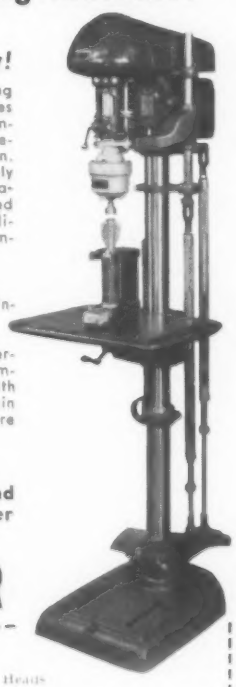
1. Lead accuracy over the full range of the screw is within a fraction of 1/10000" due to REED's exclusive process used in forming the micrometer thread. This process makes variations virtually impossible.
2. Longer life of the micrometer screw due to a burnishing process which compresses the surface of the thread making the steel more dense, resulting in greater resistance to wear.
3. Easy reading graduations on thimble and vernier due to freedom from glare and reflection.
4. Fine, sensitive touch because of the smoothness and accuracy of the thread over its full length.

Write today for literature describing the simplified types of REED Micrometers now being produced in ever increasing volume.

GEORGE SCHERR CO. INC. 132 Lafayette St. New York, N. Y.

A NEW USE
for Procunier Tapping Machines

Speeds Up Assembly Output Tremendously!



By using a specially constructed tapping head, this Procunier Tapping Machine becomes an effective assembling unit. Items are assembled in a fraction of the time formerly required—and all to a uniform degree of tension. Then, if desired, the set-up can be quickly transformed back into a standard tapping machine. This unit here illustrated is being used to assemble caps and tail mechanism for military equipment. Many similar types of assembly jobs can be handled.

Have Many Advantages

Procunier Universal Tapping Machines include: 1. Four speeds, ranging from 390 to 2050 R.P.M. 2. One machine handles tap sizes from No. 2 to ½" through two interchangeable heads. 3. Extra long Spiral Compensating Springs conveniently located, with wide range hand screw adjustments, maintain present tap feeding and reversing pressure INDEPENDENT OF OPERATOR.

Send for Catalog

giving full details, description and prices on the full line of Procunier Universal Tapping Machines.

PROCUNIER

Procunier Safety Chuck Co.
12-18 S. Clinton St., Chicago, Ill.
Send me bulletins on: ☐ High Speed Tapping Heads ☐ Tru-Grip Tap Holders ☐ Universal Tapping Machines
Name .....
Address ..... City ..... State .....

EVANS HIGH SPEED STEEL REAMERS

WILL SHIP ON 30 DAYS' TRIAL

LOOK AT THESE FEATURES

- No honing.
- Will not chatter.
- Chrome-like finish.
- Perfect alignment.
- Full bearing surface.
- Left and right spirals.
- 50 to 80 thousandths expansion.
- Cannot fall in slots or oil grooves.
- Extension pilots for line-up work.

WRITE FOR CIRCULAR

EVANS FLEXIBLE REAMER CORPORATION
4539 Ravenswood Ave., Chicago, Ill.

Help to Conserve

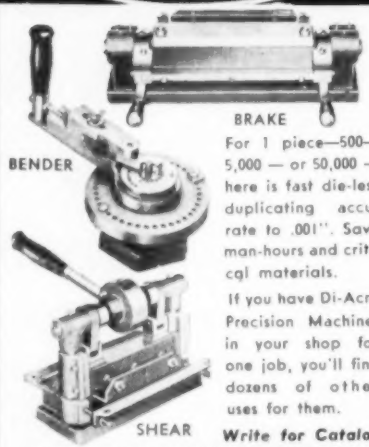
If you've recently changed your position or if your firm name has been changed, help us and the Post Office by giving us your address change at this time.

Fill in the coupon below in the interest of economy and make sure your issue of The TOOL ENGINEER reaches you promptly each month.

Name .....
Your Firm Name* .....
Firm Address .....
City ..... State .....
Products of Firm .....

If your firm name has been changed during the past two years, please write in former name below.

DI-ACRO
"DIE ACCURACY WITHOUT DIES"
PRECISION MACHINES



For 1 piece—500—5,000 — or 50,000 — here is fast die-less duplicating accurate to .001". Save man-hours and critical materials.

If you have Di-Acro Precision Machines in your shop for one job, you'll find dozens of other uses for them.

Write for Catalog

O'NEIL-IRWIN MANUFACTURING CO.
307—8th Ave. S. Minneapolis, Minn.

The DI-ACRO SYSTEM *of*
METAL DUPLICATING
—without Dies!

DECEMBER MEETINGS

BINGHAMTON — December 2. 7:30 P. M. Arlington Hotel. Speaker will be Mr. G. E. Brumbach, Metallurgist, Metallurgical Department, Carpenter Steel Company of Reading, Pa. Subject of his talk will be "Tool Steel."

GRAND RAPIDS (WESTERN MICHIGAN) — December 14. 6.45 P. M. Rowe Hotel, Grand Rapids. Program will feature "The Wizard of Waukesha". This will be a fun session where a group of humorous inventions will be shown.

HAMILTON — December 11. 7:00 P. M. Royal Connaught Hotel, Hamilton. The speaker will be Mr. Fred Schytte of Canadian Illinois Tools, Ltd. Subject will be "Broaching in War Industry."

HARTFORD — December 7. Frank W. Curtis will show a color movie on Precise Heat Treating.

LOS ANGELES — December 12. This meeting will be the Christmas party for the chapter.

MILWAUKEE — December 10. Republican House, Milwaukee. Dinner 7:00 P. M. Program to follow.

MOLINE — December 9. Program for this chapter meeting will be for a Ladies' Night party.

MONTREAL — December 9. Speaker will be Herman F. Zorn of the V & O Press Company at Hudson, N. Y. He will give a talk on general press work and will specialize on small arms ammunition and its production on presses.

ROCHESTER — December 9. 6:15 P. M. University of Rochester. "Light Waves and Their Use in Precision Measuring" will be the topic presented by the speaker, A. Gabriel. Reservations: C. G. Newton, Stone 2893.

SPRINGFIELD (MASS.) — De-

JUNKIN
PRESS GUARD

★ Maximum protection for your men, and your profits
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cember 14. Dinner 7:00 P. M. Hotel Kimball. This will be the Annual Executives' Night. Dr. Stockdale will be the main speaker and J. Y. Scott will be the toastmaster for the program.

ROCKFORD — December 3. Dinner 7:15. Hotel Faust. Talk will be given on modern plastics. Reservations: John Breutzman of Allis Chalmers, 510 Gas-Electric Bldg. Main 6270.

SYRACUSE — December 15. Dinner 7 P. M. Meeting 8 P. M. Onandaga Hotel. R. A. Cole, Experimental Engineer, will talk on "Measuring Surface Finish." Reservations: Phone R. Coseo, Crouse-Hinds Company, 2-1111.

WINDSOR — December 14. "Bill" Horlick of the Norton Company of Canada will talk on "Abrasives and Their Uses — From the Raw Materials to the Finished Products." Includes sound film in color.

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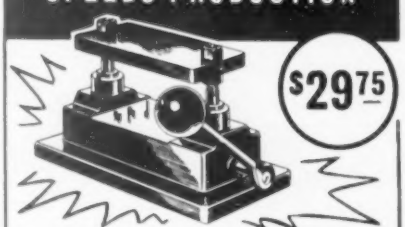

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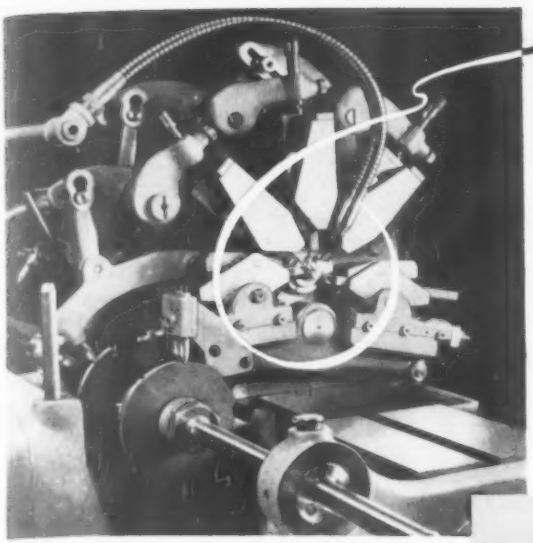
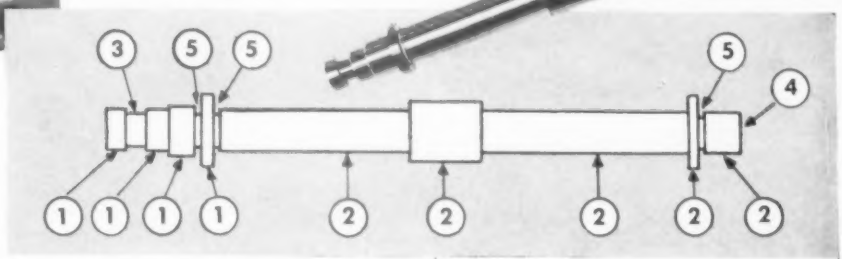


Five Individually Cam-Fed Tools OPERATING EXTREMELY CLOSE TO WORK GUIDE BUSHING



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HIGH FINISH
EXTREME ACCURACY
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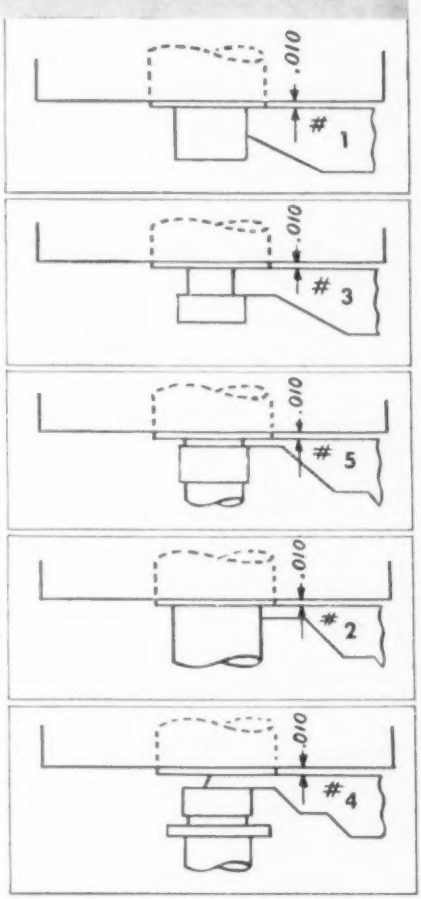
Produced By This Machine

Shown above is a part typical of those produced on the Wickman High Precision Automatic. To secure the various diameters, undercuts and cut-off, five individually cam-fed single point tools are employed. The sliding headstock is also operated by a cam and controls the various lengths. Identified by number on the line drawing of the completed part, and in cutting position in the drawings at the right, are the tools used to perform each operation.

It is to be noted that, in producing this part, the tools are supported very close to the contact point. At no time is it ever necessary for the cutting tools to operate further than 1/32" from the guide bushing.

All tool holders are provided with both radial and lateral micrometer adjustments. The collet capacity is up to 1/2" diameter, and maximum turning length is 4". 28 spindle speeds up to 7000 R.P.M. and infinite feed rates are available. Attachments for drilling, threading, tapping and slotting can be supplied as standard accessories.

A NEW EIGHT PAGE BOOKLET, COMPLETELY DESCRIPTIVE OF THE OPERATION AND CONSTRUCTION OF THIS MACHINE, IS JUST OFF THE PRESS. WRITE FOR IT.



SPECIFICATIONS OF PART SHOWN

Part – 3-27/64" long – ten diameters between 5/32" and 23/64" – three undercuts.

Material – Stainless steel – Black and Red.

Production – Approx. 12 pieces per hour.

Tolerance – ±.0005" on all diameters.

Finish – 25 to 30 Micro-inches.

WICKMAN HIGH PRECISION AUTOMATIC

(SWISS TYPE)

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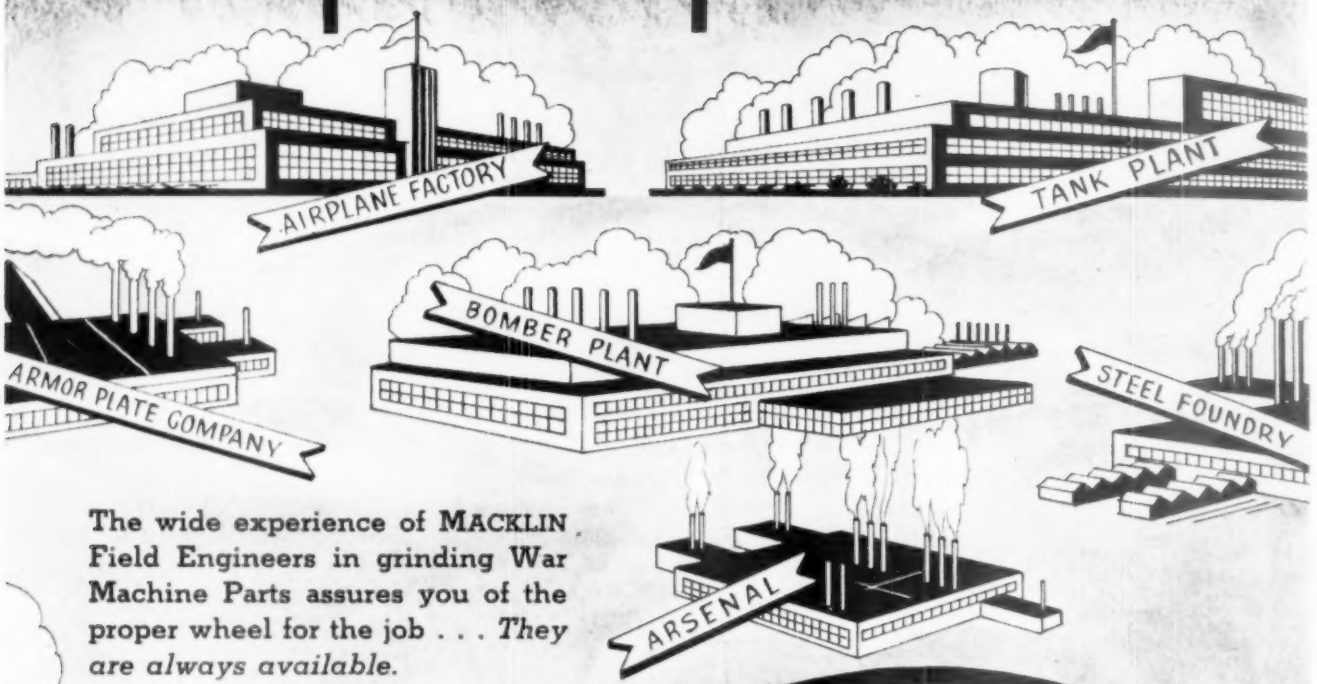

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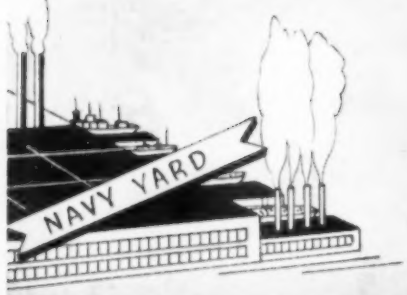

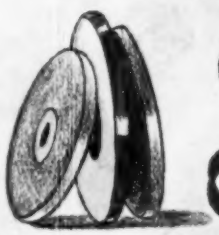

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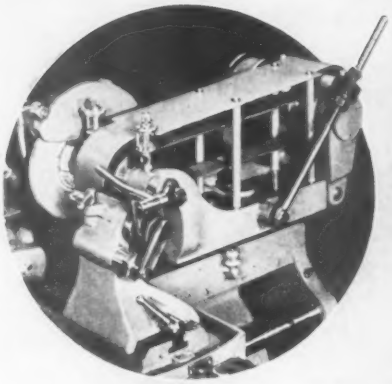
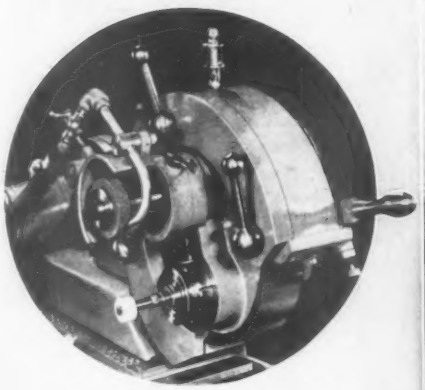
104 INT.-EXT. GRINDER

For Small Hole, Cylindrical and Concentric Grinding

104 INT.-EXT. GRINDER



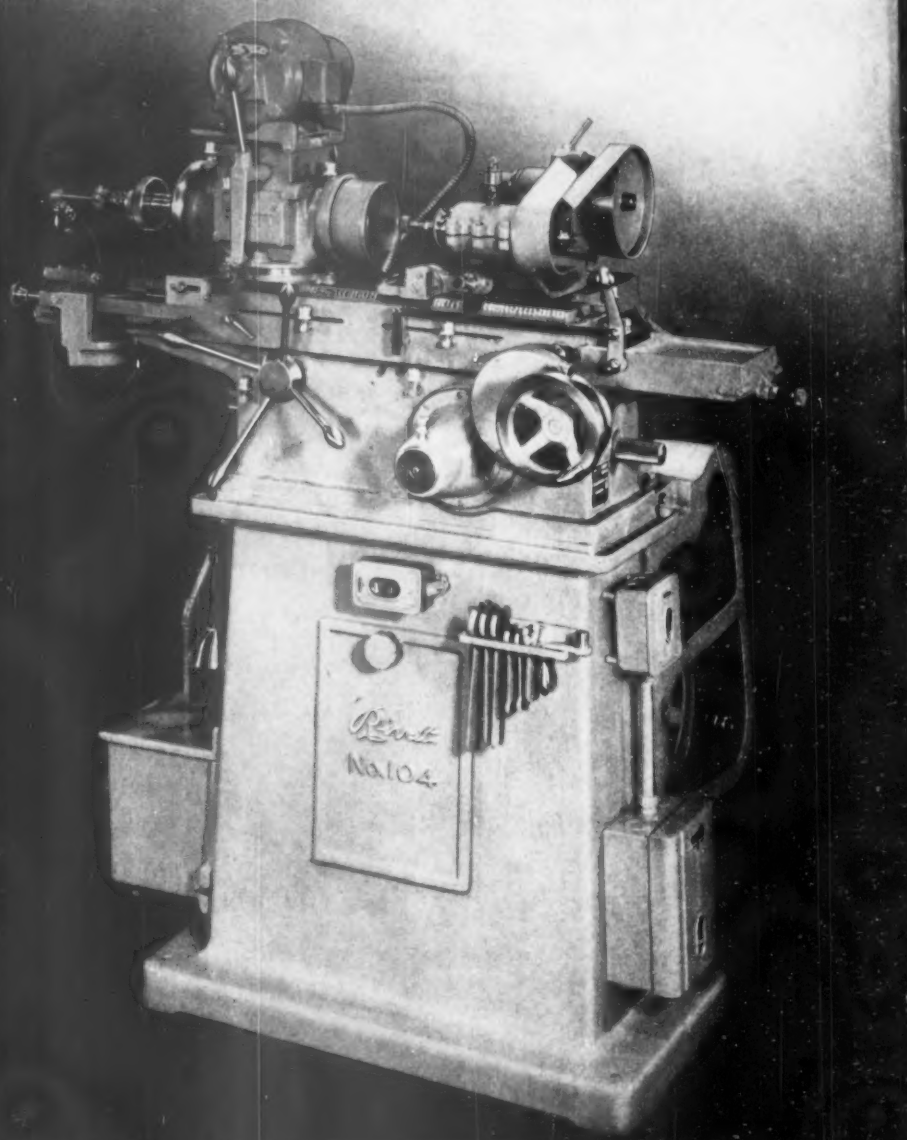
External Spindle and Tailstock



Internal and External Spindles in Turret

The Rivett No. 104 is a simple, accurate grinder suitable for die and tool making as well as precision manufacturing. Its ease of set-up and operation and its selective spindles make it an efficient machine for internal and external grinding. The internal or external grinding spindle is [illegible] selectively mounted on cross slide as desired. [illegible] work requiring concentric grinding of internal and external diameters or one chucking, turret carrying both internal and external [illegible] be used.

Work may be held in collet, step chuck, jaw chuck or fixture or on centers when using external [illegible] table reciprocation has three speeds from 54 to 126 passes per minute. Length of table travel is infinitely adjustable between ¼" and 2" or ½" and 4" depending on range selected.



SPECIFICATIONS

Grinding cap., hole dia.	up to 3"
Grinding cap., outside dia.	up to 3"
Automatic table travel	
Standard	¼" to 2"
Special	½" to 4"
Hand table travel	11"
Swing over table	8"
Center distance	8"
Workhead swivel	90°
Table swivel	5°
Cross feed graduations	
Standard	.0005"
Special	.0001"
Travel of cross slide	1¾"
Collet capacity	⅞"
Step chuck capacity	6"
Jaw chuck capacity	6"
Workhead spindle speeds	200, 375, 600 r.p.m.
Grinding spindle speeds:	
Standard int.	21000 and 25000 r.p.m.
External	3800 r.p.m.
Net weight with motors	1750 lbs.

For Further Description Write for Bulletin 104

RIVETT LATHE & GRINDER INC.

BRIGHTON, BOSTON, MASS.

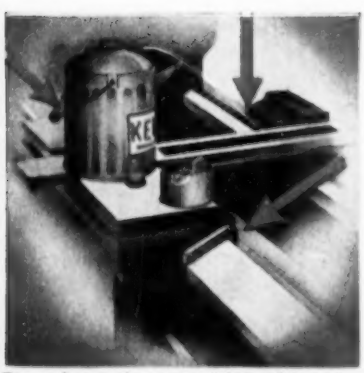
PIONEERS IN BENCH LATHE DEVELOPMENT

"I'm Tellin' You . . ."

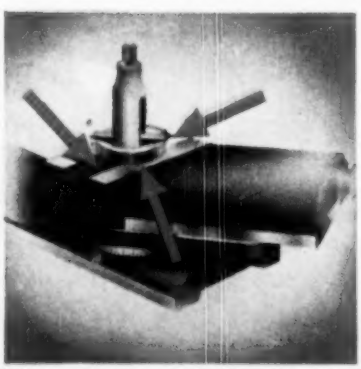
(No. 3 in a series of tips on "Keeping 'em Turning")

by **John Gauche—40 years with LeBlond**

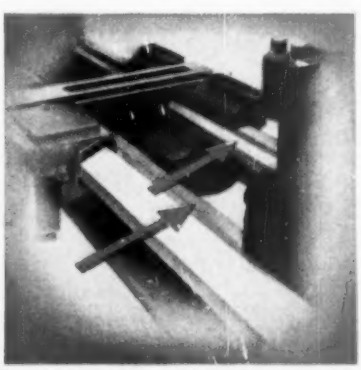
When a lathe hand gets absorbed in turning out a piece of work, it's awfully easy for him to forget that Cleanliness is next to Godliness. But if he does forget, and allows his machine to get choked up with chips and turnings—look out, brother, that's trouble! Just as a reminder, I'd like to point out the spots that need close watching to keep your lathe running accurately and smoothly.



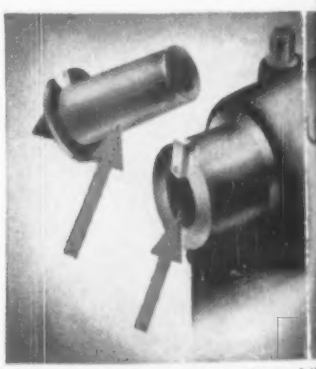
The wipers do a good job of keeping ordinary turnings out from under the carriage. But when you work with cast iron, you should remove the wipers occasionally and clean them in kerosene to rinse out the dust and grit.



When you place a tool in the tool post, check to be sure there are no turnings between the collar and the compound rest, or between the wedge and the collar. Your tool can't get a firm rest in a dirty tool post.



Don't move the tailstock along the ways without first carefully wiping off all chips. Turnings on the ways will throw the tailstock out of alignment and ruin your accuracy. Also keep tailstock spindle clean.



Before replacing center, wipe out the hole and clean the tapered part of the center. When using drills, chucks or reamers be sure they are tight in the taper hole. If there is dirt between the two, the part will revolve and cut the taper hole.

THE R. K. LeBLOND MACHINE TOOL COMPANY

Cincinnati, Ohio

Largest Manufacturer of a Complete Line of Lathes